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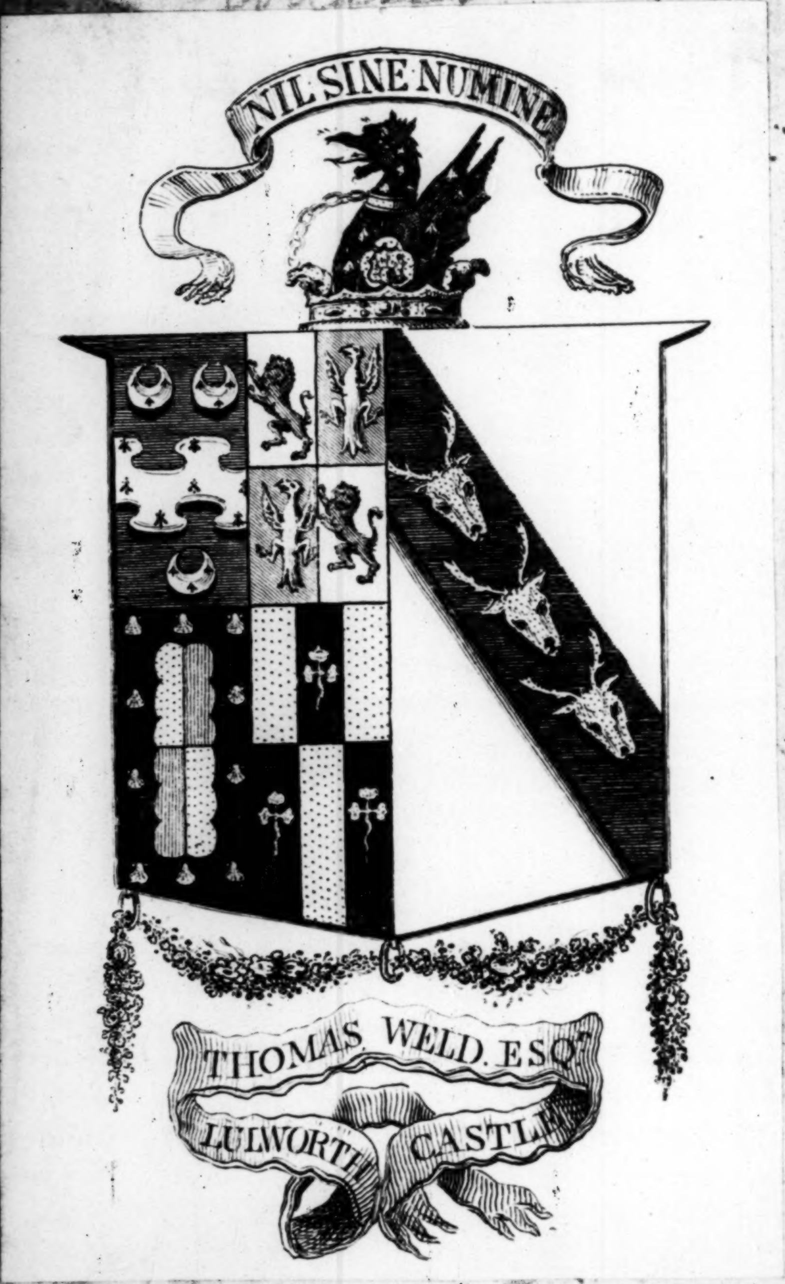

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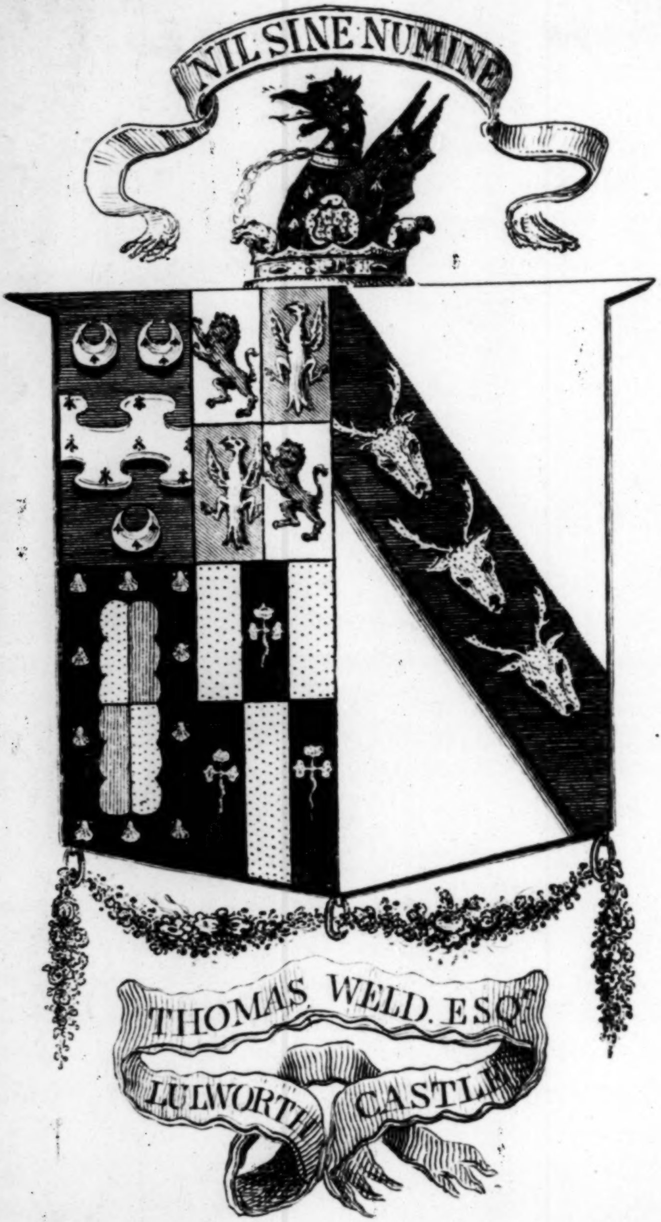

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AN
ESSAY
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After a New Method, and to make
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Very Conciſe:

Containing,

Many New and Excellent RULES on Vulgar Fractions and Mix'd Numbers; ſome Critical Obſervations on Numbers; Multiplication and Diviſion of Money, Weight and Meaſure; with theſe following Practical Rules, *viz.*

I. Fellowſhip,
II. Barter,
III. Loſs and Gain,
IV. Intereſt,
V. Rebate or Diſcount,
VI. Exchange.

To which is annex'd,
Various Practical and, laſtly, Miſcellaneous Queſtions, with their Anſwers.

By W. BRIDGES, Schoolmaſter in *Rotterdam*.

Scire tuum nihil eſt, niſi te ſcire, hoc ſciat alter.
Ne pudeat quæ neſcieris, te velle doceri.
Scire aliquid, laus eſt; turpe eſt nil diſcere velle.

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HAVING Peruſed this Book, and finding it in the moſt Practical Parts of Arithmetick, ſo methodically contracted, I recommend it as a very good Help to all concerned in Trade and Merchandize, whoſe Buſineſs requires Expedition.

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1718.

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TO THE

READER.

Courteous Reader,

AS the Laws of GOD *and Nature do bind every Man to be uſeful, ſome way or other, to his Fellow-Creatures; ſo do I find my ſelf obliged to expoſe this ſmall Treatiſe to thy View, notwithſtanding the many Books already extant on the ſame Subject. I am not unſenſible of the various Cenſures that may be paſt on It, and the Author; yet am not diſcouraged thereby, to publiſh, and preſent*

preſent to the World, a New Method of Calculating Accompts.

Laſt Year I prepar'd for the Preſs, ſomething on almoſt all the Rules of Vulgar Arithmetick; deſigning the ſame chiefly for the uſe of Engliſh *Schools in the* Netherlands; *but Impediments came in the way and hindred the Publication thereof; which I now keep for the Uſe of my Scholars. Yet, having obſerved, that many Accompts may be calculated much ſhorter than is uſually Taught, I found it my Duty to give ſome Hints thereof to others, who will be at the Pains to conſider and examine Things duly: not doubting but the Ingenious Accomptant will here find Matter, both pleaſant and profitable to him. And tho' the bulk of this Book be little, yet the Matter it treats of, is of no ſmall Extent.*

To the READER.

I have purpoſely omitted to inſert the Operation of many Examples and Queſtions for the Learner's Exerciſe and Advantage, leſt he ſhou'd miſpend Time in copying Things over: but have laid down ſufficient Grounds to aſſiſt the Judicious and Diligent, whether under the Inſpection of a Teacher, or not.

It will be of no uſe for firſt Beginners; but for ſuch as have made good progreſs already in Arithmetick, and are capable to learn by a Book, it may be very advantagious, if they attentively apply themſelves to work all the Examples contain'd therein (ſo oft) till they become ſkilful and expert in the Rules deliver'd. This is the fruit of much Study and Pains: And it were an eaſy matter to diſcover, in many Particulars, the difference between the Way uſually taught by Authors,

thors, and what is to be found in this Book. Conſider well theſe two Inſtances; firſt, to find the common Denominator to Fractions of divers Denominations, as for Example, if $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, and $\frac{5}{6}$ *were given, the common way is, to multiply all the Denominators continually together for new Denominator, which wou'd amount to* 720. *A late* Engliſh *Author (very good in many things, and even the beſt I have ſeen,* viz. W.W.) *ſays, the common Denominator* muſt be *the Product of all the given Denominators multiply'd together. Sometimes, indeed it muſt be ſo, but need not always: For, according to the Rule in this Book,* 60 *is the leaſt common Denominator; and ſeeing ſmall Numbers are eaſier to work by than greater, Is not that way preferable which ſhews to find and work by ſmaller? I hope that*

that Engliſh *Authors and Teachers will take notice of this. Another Inſtance is, At* 14 *l.* 10 *s.* 6 *d.* per *Bag, what coſt* 55 *Bags? The uſual way is, to reduce all to Pence, then to multiply by* 55, *and afterwards to divide by* 12, *and by* 20: *But I have taught to perform this, and ſuch like Queſtions, much ſhorter; for which ſee* Multiplication of Money, *&c.*

I ſhall only add, That if this Fruit of my Labour find good Acceptance in the World, and if due Encouragement be given, perhaps a larger and more compleat Arithmetick-Book may be compoſed and made ready for the Preſs, by him, who deſires to employ his Talent for the Benefit of his Country-men. Mean while, if this be ſerviceable, I ſhall think my Pains well beſtow'd, as *being one who deſires, and (where preſent) endeavours Youth's Proficiency, and the Progreſs of Arts.*

WILLIAM BRIDGES

EXPLANATION
OF SOME
CHARACTERS,
Uſed for Brevity's ſake.

+ IS a Mark of Addition, denoting, that the Numbers it is plac'd between, are to be added together.

— Is a ſign of Subſtraction, ſhewing, that the Number following it, is to be taken from that preceeding the ſame.

× Signifies Multiplied by, betokening, that the Numbers plac'd on each ſide thereof, are to be multiplied together.

= Is a Mark of Equality, and denotes, that the Number (or Numbers) before it, is equal to what follows it.

Note.

12 Deniers	make	1 Solz.
20 Solz		1 Livre.
3 Livres, or 60 Solz		1 *French* Crown

16 Pennicks	make	1 Stiver.
20 Stivers		1 Guilder.
6 Guilders		1 Pound *Flem.*

12 *d.* or Pence *Flemiſh*, make a Shilling, or 6 Stivers; 20 *s.* or Shillings *Flemiſh*, make a Pound *Flem.*

This Mark *Gl.* before a Sum, denotes, Guilders, Stivers, and Pennicks or Penningen; thus, *Gl.* 457 : 17 : 8. ſignifies, 457 Guilders, 17 Stivers, and 8 Pennicks.

A Number on the Right hand of a Line, denotes, Multiplication, and on the Left, Diviſion.

OF
FRACTIONS
In General.

THE Doctrine of Fractions depends upon this Suppoſition, That one whole Thing, whatſoever it be, may be conceived diviſible into any Number of equal Parts.

A Fraction, or broken Number, is one, or more, Part, or Parts, of an Integer, or whole Thing, according as it is divided; and conſiſts of Two Parts, *viz.* a Numerator, and Denominator; which are placed one above the other, and ſeparated by a little Line, thus, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, *&c.* theſe are thus expreſſed, One Half, Two Thirds, Three Fourths, Four Fifths, *&c.*

The Denominator is placed below the Line, and ſheweth, into how many equal Parts the Integer, or Unit is divided.

The Numerator is ſet above the Line, and ſheweth how many of the ſaid equal Parts are in the Fraction.

A Fraction is either Vulgar, or Decimal.

A Vulgar Fraction, is Simple or Compound.

A Simple Fraction is immediately the Fraction of an Integer; as, $\frac{2}{3}$, $\frac{5}{9}$, $\frac{7}{12}$.

A Compound Fraction, is a Fraction of a Fraction; as, $\frac{1}{2}$ of $\frac{2}{3}$, $\frac{3}{4}$ of $\frac{5}{6}$, *&c.*

A Simple Fraction is Proper, or Improper.

A Proper Fraction has its Numerator leſs than the Denominator.

An Improper Fraction, hath the Numerator greater than its Denominator.

When the Numerator and Denominator are equal, the Fraction is equal to an Unit; as, $\frac{2}{3}$, $\frac{5}{5}$, $\frac{7}{7}$, $= 1$.

If the Numerator and Denominator of a Fraction be multiplied by any Number, or both divided by one and the ſame Number, ſo that Nothing remains, that Fraction will be of the ſame Value as before.

Abbreviation of FRACTIONS.

A General Rule.

OF the Numerator and Denominator, divide the greater by the leſs; if any thing remain, divide the Diviſor thereby; and thus continue to divide always the laſt Diviſor by the laſt Remainder, till nothing remains, (rejecting the Quotients) and this laſt

Diviſor will be the greateſt common Meaſure, whereby the Numerator and Denominator muſt be divided, to bring the Fraction into its loweſt Terms.

Note, If 1 be the laſt Diviſor, the Fraction cannot be abbreviated, for it is in its loweſt Terms already.

Examples.

(1) Abbreviate $\frac{95}{437}$, *Facit* $\frac{5}{23}$ by 19.

The Operation.

$\cancel{3}8$

$$\frac{95}{437} \; (4.1.1.2.$$

57

(19

$$\frac{95}{437} \quad 8 \qquad 19 \;|\; 5 \;|\; 23$$

The Manner of Operation.

Divide the Denominator 437 by the Numerator 95, reſts 57; then divide 95 by 57, there remains 38; again divide 57 by 38, the Remainder is 19; laſtly, dividing 38 by 19, there remains 0. Therefore 19 is the greateſt common Meaſure of the given Fraction $\frac{95}{437}$, and thereby both the Numerator 95, and Denominator 437, can be divided, ſo that 0 will remain; as is evident by the Operation. In like Manner may all other Fractions be abbreviated, that are not in their leaſt Terms.

(2.) Reduce $\frac{162}{144}$ into its loweſt Terms. *Facit* $\frac{9}{8}$ (or 1 $\frac{1}{8}$) by 18.

$$\begin{array}{l|l|l} \underline{(18} & & \overline{18} \\ \frac{\cancel{1}6\cancel{2}}{\cancel{1}44}\ (1.8 & \frac{\cancel{1}6\cancel{2}}{\cancel{1}44} & \frac{9}{8} = 1\,\frac{1}{8} \\ 0 & & \end{array}$$

Note, In the Operation, the Numbers may be otherwiſe plac'd; but this Way takes leaſt room.

The induſtrious Learner may abbreviate theſe following Fractions, *viz.*

(3.) $\frac{91}{117}$ to $\frac{7}{9}$; by 13.
(4.) $\frac{116}{145}$ to $\frac{4}{5}$; by 29.

(5.) $\frac{561}{612}$ to $\frac{11}{12}$; by 51.

(6.) $\frac{153}{207}$ to $\frac{17}{23}$; by 9.

(7.) $\frac{221}{234}$ to $\frac{17}{18}$; by 13.

(8.) $\frac{1775}{2325}$ to $\frac{71}{93}$; by 25.

(9.) $\frac{221}{377}$ to $\frac{17}{29}$; by 13.

(10.) $\frac{176}{208}$ to $\frac{11}{13}$; by 16.

(11.) $\frac{2625}{5700}$ to $\frac{35}{76}$; by 75.

(12.) $\frac{24897}{33196}$ to $\frac{3}{4}$; by 8299.

(13.) $\frac{1310}{1703}$ to $\frac{10}{13}$; by 131.

(14.) $\frac{1369}{13986}$ to $\frac{37}{378}$; by 37.

(15.) $\frac{6048}{7392}$ to $\frac{9}{11}$; by 672.

(16.) $\frac{3081}{20382}$ to $\frac{13}{86}$; by 237.

Tho' the preceeding Rule be general, and may ſerve in all Caſes, yet ſometimes a Fraction may be abbreviated more ſpeedily, by one or more of the following practical Rules.

I. When the Numerator and Denominator do each of them end with a Cypher, or Cyphers; cut off equal Cyphers in both, and the remaining Figures will be a Fraction of the ſame Value, in leſſer, if not in its leaſt Terms.

Examples.

Examples.

(1.) $\frac{31000}{57000}$ is equal to $\frac{31}{57}$.
(2.) $\frac{5300}{6800}$ is $\frac{53}{68}$.
(3.) $\frac{320}{960}$ is equivalent to $\frac{32}{96}$.
(4.) $\frac{21000}{47500}$ is equal to $\frac{210}{475}$.

II. When the Numerator and Denominator do each end with 5, or the one with 5, and the other with 0, they may both be divided by 5.

Examples.

(1.) $\frac{225}{475}$ is $\frac{45}{95} = \frac{9}{19}$.
(2.) $\frac{50}{425} = \frac{10}{85} = \frac{2}{17}$.
(3.) $\frac{75}{100}$ is $\frac{15}{20}$, or $\frac{3}{4}$.

III. If the Numerator and Denominator be even Numbers, the Fraction may always be abbreviated by 2, and ſometimes by 4, 6, 8, *&c.*

Examples.

(1.) $\frac{16}{64} = \frac{8}{32} = \frac{1}{4}$.
(2.) $\frac{48}{112} = \frac{24}{56}$ or $\frac{3}{7}$.

(3.) $\frac{98}{144} = \frac{48}{72} = \frac{12}{18} = \frac{2}{3}$.

(4.) $\frac{192}{320} = \frac{96}{160} = \frac{24}{40} = \frac{3}{5}$.

IV. Whenever you can diſcern any Number that will equally divide both Numerator and Denominator, you may abbreviate the Fraction thereby, as in theſe

Examples.

(1.) $\frac{84}{105}$ is $\frac{4}{5}$; by 3 and 7.

(2.) $\frac{54}{162} = \frac{1}{3}$; by 6 and 9.

(3.) $\frac{84}{210}$ makes $\frac{2}{5}$; by 7 and 6.

(4.) $\frac{168}{392}$ will be $\frac{3}{7}$; by 7 and 8.

Note, 1. When the Sum of all the Figures in any Number is diviſible by 3, without a Remainder, then ſuch a Number is alſo diviſible thereby.

2. When the Figures poſſeſſing the two firſt Places of any Number, are diviſible by 4, then the Number is alſo diviſible by 4; thus 327464, is diviſible by 4, becauſe 64 is ſo.

3. When the Sum of all the Figures in an even Number is equally diviſible by 3, that Number may be divided by 6.

4. All Numbers, whoſe Figures poſſeſſing the three firſt Places are equally diviſible by 8, may alſo be divided by 8.

5. If the Sum of all the Figures in any Number be equally diviſible by 9, the ſaid Number may be divided by 9, and 0 will remain.

Repeat the Operation, according to theſe Rules and Notes, as often as you can.

REDUCTION

OF

FRACTIONS

I. TO Reduce Fractions of divers Denominations to a common Denominator.

This Rule has two Parts, *viz.* To find the leaſt common Denominator; and, To find the new Numerators.

Firſt, To find the leaſt common Denominator, the Rule is,

When the Denominators are all Numbers prime to one another, they muſt be all continually multiplied together: But if two, or more, of the Denominators be equally diviſible by any Number, then place them evenly beſide one another, and draw a Line under them; then divide the ſame by a Prime Number, placing the Quotients under the ſaid Line. Again, If two, or more, of the Quotients and Denominators (not yet divided) be diviſible by a Prime Number, continue ſo dividing as oft as poſſible. Laſtly, Multiply the Diviſor, or Diviſors, Quotients, and remaining Denominators (if any) continually together, and the Product will be the leaſt common Denominator ſought.

A Prime (or firſt) Number is, what is meaſured only by an Unit.

Note, If any of the Denominators be an Aliquot Part of another, ſuch may be cancell'd.

Examples.

(1.) What is the leaſt common Denominator to $\frac{2}{3}$, $\frac{3}{4}$, & $\frac{4}{5}$? *Anſw.* 60.

Say $3 \times 4 \times 5 = 60$.

(2.) Find the leaſt common Denominator to $\frac{4}{9}$ and $\frac{7}{12}$: *Facit* 36.

The Operation.

```
        4  ·  7
       ——     ——
        9  ·  12
   3  ——————————
   —    3  :  4
   9
   — 4
  36
```

The Manner of Operation.

Having plac'd the Fractions as above, and drawn a Line under them, divide the Denominators 9 and 12 by 3, they quote 3 and 4; which three Numbers, 3 3, , and 4, continually multiplied together, do produce 36, for the leaſt common Denominator.

(3.) Let $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, and $\frac{5}{6}$, be given; and their leaſt common Denominator, found by the Rule and Note, is 60.

$$\frac{1}{\cancel{2}},\ \frac{2}{\cancel{3}},\ \frac{3}{4},\ \frac{4}{5},\ \frac{5}{6}$$

$$\begin{array}{rl}
2 & \overline{} \\
\overline{} & 2.\ 5.\ 3 \\
4 & \\
\overline{} & 5 \\
20 & \\
\overline{} & 3 \\
60 &
\end{array}$$

The Manner of Operation.

According to the Note, cancel 2 and 3, being Aliquot Parts of 4 and 6, then divide 4 and 6 by 2, and there quotes 2 and 3. Laſtly, multiply 2, 2, 5, and 3, continually together, and 'tis done.

In like Manner do for the leaſt common Denominator always, according to one of theſe three Examples, or that which follows.

(4.) What is the leaſt common Denominator to $\frac{1}{8}$, $\frac{5}{9}$, and $\frac{7}{12}$? Anſwer, 72.

$$\begin{array}{r|l} 3 & 8.\ \ 9.\ \ 12 \\ \hline 2 & 8.\ \ 3.\ \ 4 \\ \hline 2 & 4.\ \ 3.\ \ 2 \\ \hline & 2.\ \ 3.\ \ 1 \end{array} \qquad 3\times2\times2\times2\times3=72.$$

The ingenious Learner may exerciſe himſelf in finding the leaſt common Denominator to the following Fractions, *viz.*

(5.) $\frac{7}{8}$, $\frac{11}{12}$ and $\frac{5}{16}$: *Facit* 48.
(6.) $\frac{2}{3}$, $\frac{3}{4}$ and $\frac{7}{8}$: *Facit* 24.
(7.) $\frac{1}{2}$, $\frac{2}{3}$, $\frac{2}{6}$ and $\frac{3}{4}$: *Facit* 60.
(8.) $\frac{3}{4}$, $\frac{5}{6}$, $\frac{9}{10}$ and $\frac{7}{9}$: *Facit* 180.
(9.) $\frac{4}{9}$, $\frac{7}{12}$ and $\frac{13}{36}$: *Facit* 36.
(10.) $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, $\frac{5}{6}$, $\frac{9}{10}$, $\frac{11}{12}$, $\frac{14}{15}$ and $\frac{29}{30}$: (*Facit* 60.
(11.) $\frac{1}{2}$, $\frac{3}{4}$, $\frac{4}{5}$, $\frac{6}{11}$, $\frac{13}{22}$, $\frac{23}{44}$ and $\frac{39}{55}$: (*Facit* 220.

Secondly, To find new Numerators to the common Denominator.

Rule. Divide the common Denominator by each particular Denominator, and multiply the Quotients by their reſpective Numerators, and the Products will be the Numerators required.

Examples.

(1.) What are the new Numerators to $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{7}{8}$ (the common Denominator being 24)? Anſwer, 16, 18, and 21.

The Operation.

Say, How many times 3 in 24? 8 times; twice 8 is 16, for the firſt Numerator: How many times 4 in 24? Anſwer 6; 3 times 6 is 18, for the ſecond: How oft 8 in 24? 3 times; thrice 7 is 21, for the third Numerator. Thus $\frac{16}{24}$, $\frac{18}{24}$, and $\frac{21}{24}$, are equivalent to $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{7}{8}$.

	24
$\frac{2}{3}$	16
$\frac{3}{4}$	18
$\frac{7}{8}$	21

In like Manner may the Numerators be found for all the preceeding Fractions, which is left for the Learner's Exerciſe.

II. To reduce a Compound Fraction to a Simple one equivalent thereto.

Rule. Multiply all the Numerators continually together, for a new Numerator; and all the Denominators for a new Denominator; then reduce the new Fraction to its loweſt Terms, and it's done.

Examples.

1. Reduce $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ to a Simple Fraction. *Facit* $\frac{1}{4}$

The Operation.

$$\frac{1}{2}\times\frac{2}{3}\times\frac{3}{4}=\frac{6}{24}\Bigg|\begin{array}{c}6\\\hline\frac{1}{4}\end{array}$$

Say, Once 2 is 2, twice 3 is 6, for the new Numerator. Then, twice 3 is 6, 6 times 4 is 24, for the new Denominator; which $\frac{6}{24}$ is equal to $\frac{1}{4}$.

Do ſo with other Fractions.

2. What is $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5}$ of a Pound Sterling? *Anſw.* $\frac{2}{5}$ *l.* or 8 *s.*

3. If $\frac{3}{4}$ of $\frac{1}{12}$ of $\frac{1}{20}$ be reduc'd to a Simple Fraction, what does it come to? *Anſw.* $\frac{1}{320}$.

4. How much is $\frac{2}{3}$ of $\frac{3}{5}$ of $\frac{5}{8}$ *l.*? *Anſw.* 5 *s.*

5. What is $\frac{1}{2}$ of $\frac{3}{8}$? *Anſw.* $\frac{3}{16}$.

6. Reduce $\frac{2}{3}$ of $\frac{1}{4}$ of $\frac{4}{5}$ to a Simple Fraction. *Facit* $\frac{2}{15}$.

7. What is $\frac{3}{4}$ of $\frac{4}{5}$ *l.*? *Anſwer*, 12 *s.*

III. To reduce a mixt Number into an Improper Fraction.

Rule. Multiply the Integral Part by the Denominator of the Fraction, to the Product add the Numerator, and under the Sum place the Denominator, with a ſmall Stroke between them.

Examples.

1. Reduce $3\frac{1}{2}$ to an improper Fraction. *Facit* $\frac{7}{2}$.

Say, Twice 3 is 6, and 1 is 7, for the Numerator, *&c.*

$3\frac{1}{2}$
—— 2
$\frac{7}{2}$

2. What is $7\frac{3}{4}$, being reduced to an improper Fraction? *Anſw.* $\frac{31}{4}$.

3. Bring $8\frac{3}{5}$ to an improper Fraction: *Facit* $\frac{43}{5}$.

4. Reduce $20\frac{6}{7}$ to an improper Fraction: *Facit* $\frac{146}{7}$.

IV. To Reduce a Whole Number to an Improper Fraction.

Rule. Place 1 for its Denominator, and 'tis done: Or, If any other Number be aſſign'd for the Denominator, then multiply the whole Number thereby, placing the Product over the ſame.

Examples.

Examples.

Thus 10 is $\frac{10}{1}$, or $\frac{60}{6}$, or $\frac{100}{10}$, or $\frac{500}{50}$, *&c.*

And 7 is equal to $\frac{7}{1}$, $\frac{42}{6}$, $\frac{77}{11}$, or $\frac{63}{9}$, *&c.*

V. To Reduce an Improper Fraction into its equivalent, whole, or mix'd Number.

Rule. Divide the Numerator by the Denominator, and the Quotient will be the whole Number: If any thing remains, place it over the Denominator, and annex the Fraction to the whole Number.

Examples.

1. Reduce $\frac{7}{2}$ to a mixt Number: *Facit* 3 $\frac{1}{2}$.

Say, How many times 2 in 7? *Anſw.* 3, and 1 remains, which is $\frac{1}{2}$.

2. What is $\frac{31}{4}$ in its equivalent mixt Number? *Anſw.* 7 $\frac{3}{4}$.

3. If $\frac{38}{5}$ be reduc'd to a mixt Number, what will it be? *Anſ.* 7 $\frac{3}{5}$.

4. How much is $\frac{17}{4}$ of a *l.* Sterling? *Anſw.* 4 *l.* 5 *s.*

5. Reduce $\frac{146}{7}$ to a mixt Number: *Facit* 20 $\frac{6}{7}$.

6. What whole Number is equivalent to $\frac{84}{7}$? *Anſw.* 12.

VI. To find the Value of a Fraction in the known Parts of Coin, Weight, or Meaſure.

Rule. Multiply the Numerator of the Fraction by ſuch a Number, as an Unit of the Denomination the Fraction is in makes in the next inferior Denomination; then divide the Product by the Denominator, and the Quotient will be its Value, if 0 remain; but if ought remain, reduce that to the next lower Denomination, and divide as before, *&c.*

Examples.

1. What's the Value of $\frac{11}{15}$ of a *l.* Sterling? *Anſw.* 14 *s.* 8 *d.*

```
       11
       20    s.  d.
      ----
15)  220  (14 : 8. Facit.
      7(0
      (1
      ------12
      120
```

2. What is $\frac{5}{8}$ *l.* Sterling? *Anſw.* 12 *s.* 6 *d.*

3. How much is $\frac{13}{16}$ *l.*? *Anſwer*, 16 *s.* 3 *d.*

4. What is $\frac{16}{21}$ of a *C.* weight? *Anſw.* 3 *qrs.* 1 *lb.* 5 $\frac{1}{3}$ *oz.*

5. What's the Value of $\frac{3691}{5760}$ of a Pound *Troy*? *Anſw.* 7 *oz.* 13 *d.w.* 19 *gr.*

6. How many Days, Hours, and Minutes are in $\frac{41}{50}$ of a common Year? *Anſw.* 299 *d.* 7 *h.* 12 *min.*

VII. To Reduce a Fraction, or Mixt Number of a lower Name, into the Fraction of a higher Denomination.

Rule. On the left hand of the Fraction, or Mixt Number, place ſuch a Number, as an Unit of the higher Denomination makes, in that Denomination the ſaid Fraction, &c. is of, with ſome Separation between them, then multiply both by the Denominator of the Fraction, and bring them to their loweſt Terms, (if need be) as is taught in Abbreviation, ſo will the given Fraction, or Mixt Number, thus reduc'd, be the Numerator, and the other Number be the Denominator of the Fraction requir'd.

Examples.

1. What part of a *l.* Sterling is 14 *s.* 8 *d.*? *Anſw.* $\frac{11}{15}$ *l.*

s. *s.*
20——$14\frac{2}{3}$
————————3
60——44
4————————
15——$\frac{11}{15}$ *Facit.*

2. Reduce 12 *s.* 6 *d.* into the Fraction of a *l.* Sterl. *Facit* $\frac{5}{8}$ *l.*

20

s. s.
20 — 12 $\frac{1}{2}$
——— ——— 2
40 — 25
5 ——— ———
8 — $\frac{5}{8}$ *l. Facit.*

3. What Fraction of a *l.* is 16 *s.* 3 *d.*? *Anſw.* $\frac{13}{16}$ *l.*

s. s.
20 —— 16 $\frac{1}{4}$
——— ——— 4
80 —— 65
5 ——— ———
16 —— $\frac{13}{16}$ *l. Facit.*

Note, By this Rule any ſort of Money, Weight, or Meaſure, may be reduc'd; being the Converſe of the Sixth Rule.

4. What Part of a C. Weight is 3 *qrs.* 1 *lb.* 5 $\frac{1}{3}$ *oz.*? *Anſw.* $\frac{16}{21}$ C.

View well the following Operation.

q. *q.* *lb.* *oz.*

4) 3 : 1 : 5 $\frac{1}{3}$

———————— 3

12 — 9 : 4 : 0

———— 7

84 — 63

———— 4

336)256

4 ————

84 — 64

4 ————

21 — $\frac{16}{21}$ C. *Facit.*

5. Reduce 7 *oz.* 13. *d.w:* & 19 *gr.* into the Fraction of a Pound *Troy*: *Facit* $\frac{3491}{5760}$ *lb.*

6. What Fraction of a common Year will 299 *d.* 7 *h.* and 12 *min.* make? *Anſw.* $\frac{41}{50}$.

VIII. To Reduce Vulgar Fractions into Decimals.

Rule. Add Cyphers at pleaſure to the Numerator, and divide by the Denominator.

Examples.

1. Reduce $\frac{3}{4}$ to a Decimal: *Facit* 75.

3.00
4 ———
.75

2. What Decimal Parts are equal to $\frac{1}{8}$? *Anſw.* .125.

Thus Coin, Weight, Meaſure, *&c.* may be brought to a Decimal, being firſt reduc'd to a vulgar Fraction.

3. Reduce 12 *s.* 6 *d.* into Decimal Parts of a *l.* Sterling. *Fac.* 625.

4. What Decimal Parts of a *l.* Sterling are equal to 11 *s.* 3 *d.*? *Anſw.* .5625.

So much may ſerve for *Reduction of Fractions,* wherein the principal Knowledge of them does conſiſt.

ADDITION
OF
FRACTIONS.

I. TO add Simple Fractions.

Rule. If the given Fractions have a common Denominator, add all the Numerators together, and place their Sum over the common Denominator; and if this new Fraction be improper, reduce it to a whole or mixt Number. If the given Fractions have unequal Denominators, reduce them to a common Denominator, then do as above directed.

Examples.

$$\begin{array}{ll} \text{(1.) To} & \frac{1}{6} \\ \text{Add} & \left\{\begin{array}{l}\frac{2}{6}\\ \frac{5}{6}\end{array}\right. \\ \hline \text{Sum} & \frac{8}{6}=1\frac{1}{3}\end{array}$$

$$\begin{array}{ll} \text{(2.) Add} & \left\{\begin{array}{l}\frac{5}{12}\\ \frac{7}{12}\\ \frac{11}{12}\end{array}\right. \\ \text{together.} & \\ \hline \text{Total} & \frac{23}{12}=1\frac{11}{12}\end{array}$$

Add

$$(3.)\quad \text{Add}\left\{\begin{array}{r|l} & \underline{36} \\ \frac{7}{12} & 21 \\ \frac{4}{9} & 16 \end{array}\right. \qquad \begin{array}{r} \text{Sum} \\ \text{up} \end{array}\left\{\begin{array}{r|l} & \underline{60} \\ \frac{2}{3} & 40 \\ \frac{3}{4} & 45 \\ \frac{4}{5} & 48 \end{array}\right.$$

The Sum is $\frac{37}{36} = 1\frac{1}{36}$. *Fac.* $\frac{133}{60} = 2\frac{13}{60}$

II. To add mixt Numbers; or mixt Numbers, Integers, and ſimple Fractions together.

Rule. Add the Fractions, as before directed, annexing their Sum to the Sum of the Integers.

Examples.

$$(1.)\quad \begin{array}{r|l} & \underline{12} \\ 2\frac{1}{4} & 3 \\ 1\frac{1}{6} & \frac{2}{5} \\ \hline \text{Sum } 3\frac{5}{12} & \end{array} \qquad (2.)\quad \begin{array}{r} 68\frac{3}{4} \\ 6 \\ 3\frac{1}{2} \\ \hline \text{Total } 78\frac{1}{4} \end{array}$$

$$(3.)\quad \begin{array}{r|l} & \underline{8} \\ 4\frac{1}{2} & 4 \\ 3\frac{3}{4} & 6 \\ \frac{7}{8} & 7 \\ \hline \text{Sum } 9\frac{1}{8} & \underline{17} \\ & 1 \end{array} \qquad (4.)\quad \begin{array}{rrr} l. & s. & d. \\ 24 : & 12 : & 6\frac{1}{2} \\ 18 : & 16 : & 9\frac{3}{4} \\ 10 : & 11 : & 4\frac{1}{4} \\ 9 : & 8 : & 2\frac{3}{4} \\ \hline \text{Tot. } l. 63 : & 8 : & 11\frac{1}{4}\, d. \end{array}$$

III. To add compound and ſimple Fractions together.

Rule. Reduce the compound Fraction, or Fractions, to ſimple ones, then work by the firſt Rule.

Examples.

1. Add $\frac{2}{3}$ of $\frac{4}{5}$ to $\frac{3}{4}$. *Facit* 1 $\frac{1}{60}$.

$$\begin{array}{r|l} & 60 \\ \hline \frac{2}{3} \text{ of } \frac{4}{5} \text{ is } \frac{8}{15} & 16 \\ \frac{3}{4} & 45 \\ \hline \text{Sum } \frac{61}{60} = 1\frac{1}{60} & \end{array}$$

2. To $\frac{15}{42}$ add $\frac{2}{3}$ of $\frac{3}{8}$: *Facit* $\frac{51}{84}$.

$$\begin{array}{r|l} & 84 \\ \hline \frac{2}{3} \text{ of } \frac{3}{8} \text{ is equal to } \frac{1}{4} & 21 \\ \frac{15}{42} & 30 \\ \hline \text{Sum } \frac{51}{84} & \end{array}$$

IV. To add compound Fractions together.

Rule. Reduce them to ſimple ones, then work as before directed.

Examples.

1. Add $\frac{1}{3}$ of $\frac{4}{5}$ to $\frac{2}{3}$ of $\frac{3}{8}$: *Fac.* $\frac{31}{60}$.

2. Add together $\frac{3}{4}$ of $\frac{3}{8}$, $\frac{9}{10}$ of $\frac{6}{7}$, and $\frac{4}{5}$ of $\frac{5}{32}$ of $\frac{5}{1}$: *Facit* 1 $\frac{759}{1120}$.

The diligent Learner may exerciſe himſelf in adding together theſe following Examples, *viz.*

1. What is the Sum of $\frac{5}{7}$ and $\frac{3}{8}$? *Anſw.* 1 $\frac{5}{56}$.

2. What is the Amount of $\frac{1}{2}$, $\frac{3}{4}$, and $\frac{4}{5}$? *Anſw.* 2 $\frac{1}{20}$.

3. Add together $\frac{3}{4}$, $\frac{5}{6}$, and $\frac{7}{8}$: *Facit* 2 $\frac{11}{24}$.

4. To $\frac{1}{2}$, add $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{6}$: *Facit* 2 $\frac{3}{4}$.

5. What will the Sum of $\frac{2}{3}$, $\frac{3}{4}$, $\frac{1}{5}$, and $\frac{5}{6}$, amount to? *Anſw.* 2 $\frac{9}{20}$.

6. What is the Sum of 5 $\frac{3}{8}$, 8 $\frac{1}{16}$, and 9 $\frac{5}{6}$? *Anſw.* 23 $\frac{13}{48}$.

7. Add $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, $\frac{5}{6}$, $\frac{9}{10}$, $\frac{11}{12}$, $\frac{14}{15}$, and $\frac{29}{30}$ together: *Facit* 6 $\frac{23}{30}$.

8. What is the total Sum of $\frac{1}{2}$, $\frac{3}{4}$, $\frac{4}{5}$, $\frac{6}{11}$, $\frac{13}{22}$, $\frac{33}{44}$, and $\frac{39}{55}$? *Anſw.* 4 $\frac{23}{55}$.

9. What will 4 $\frac{1}{2}$, 3, 2 $\frac{1}{2}$, 16, 5 $\frac{1}{2}$, 6 $\frac{1}{3}$, 7 $\frac{3}{4}$, 11 $\frac{1}{2}$, and 11 $\frac{1}{4}$ amount to? *Anſw.* 68 $\frac{1}{3}$.

10. Add together 200 $\frac{1}{2}$, 99 $\frac{3}{8}$, 65 $\frac{4}{5}$, 125 $\frac{3}{20}$, 20 $\frac{5}{8}$, 119 $\frac{1}{4}$, and 59 $\frac{3}{4}$. *Facit* 690 $\frac{9}{20}$.

SUBSTRACTION OF FRACTIONS:

NOte, That is the greateſt of two Fractions, whoſe Numerator being multiplied by the Denominator of the other, does produce the greateſt Number.

I. To ſubſtract one ſimple Fraction from another.

Rule. They being of one Denomination, or reduc'd thereto, take the Numerator of the Subtrahend from that of the Minuend, and place the Remainder over the Denominator.

Examples.

1. From $\frac{3}{5}$ take $\frac{2}{5}$. Remains $\frac{1}{5}$.
2. Subſtract $\frac{1}{4}$ from $\frac{3}{4}$. Rem. $\frac{1}{2}$.

3. What is the Difference between $\frac{3}{4}$ and $\frac{5}{12}$? *Anſw.* $\frac{1}{3}$.

4. If $\frac{5}{12}$ be deducted from $\frac{7}{9}$, what is the Exceſs? *Anſw.* $\frac{13}{36}$.

36
From $\frac{7}{9}$ | 28
Take $\frac{5}{12}$ | 15
Remains $\frac{13}{36}$

5. From $\frac{7}{8}$ take $\frac{6}{7}$. Rem. $\frac{1}{56}$.

II. To ſubſtract a compound Fraction from a ſimple or compound one, *&c.*

Reduce the compound Fraction, or Fractions, to ſimple, then work as before directed.

Examples.

1. Subſtract $\frac{3}{5}$ of $\frac{5}{8}$ from $\frac{5}{6}$. Rem. $\frac{11}{24}$.

24
$\frac{5}{6}$ | 20
$\frac{3}{5}$ of $\frac{5}{8}$ is $\frac{3}{8}$ | 9
facit $\frac{11}{24}$

2. What is the Difference between $\frac{3}{4}$ of $\frac{4}{5}$ and $\frac{1}{2}$ of $\frac{2}{3}$? *Anſw.* $\frac{4}{15}$.

$$\begin{array}{l|c} & 15 \\ \hline \frac{3}{4} \text{ of } \frac{4}{5} \text{ is equal to } \frac{3}{5} & 9 \\ \frac{1}{2} \text{ of } \frac{2}{3} \text{ makes } \frac{1}{3} & 5 \\ \hline \textit{Facit} & \frac{4}{15} \end{array}$$

3. From $\frac{3}{5}$ of $\frac{2}{3}$ take $\frac{1}{8}$. Rem. $\frac{11}{40}$.

III. To ſubſtract a Fraction, or mixt Number from a whole Number.

Rule. Take the Numerator from the Denominator; under the Remainder place the Denominator, and take 1 from the whole Number, *&c.* as is uſual in whole Numbers.

Examples.

(1.) From 3
Take $0\frac{3}{7}$
Rem. $2\frac{4}{7}$

(2.) From 5
Deduct $0\frac{3}{4}$
Rem. $4\frac{1}{4}$

(3.) From 29
Subt. $11\frac{3}{8}$
Differ. $17\frac{5}{8}$

(4.) From 47
Take $19\frac{4}{9}$
Exceſs $27\frac{5}{9}$

IV. To ſubſtract mixt Numbers.

Rule. The Fractions having a common Denominator, or reduc'd thereto, if the fractional Part of the Subducend be leaſt, take one Numerator from the other; but if it be greateſt, take the Numerator of the Subtrahend from the common Denominator, and to the Remainder add the other Numerator; which makes a new Numerator to the common Denominator, then (carrying 1, in the laſt Caſe,) ſubſtract, as in whole Numbers.

Examples.

(1.)

$$\begin{array}{lr} \text{From} & 30\frac{3}{4} \\ \text{Take} & 23\frac{1}{2} \\ \hline \text{Rem.} & 7\frac{1}{4} \end{array}$$

(2.)

$$\begin{array}{r|r} & 42 \\ \cline{2-2} 59\frac{5}{6} & 35 \\ 37\frac{3}{7} & \frac{18}{17} \\ \cline{1-1} 22\frac{17}{42} & \end{array}$$

(3.)

$$\begin{array}{lr|r} & & 12 \\ \cline{3-3} \text{From} & 17\frac{2}{3} & 8 \\ \text{Subt.} & 9\frac{3}{4} & 9 \\ \cline{1-2} \text{Rem.} & 7\frac{11}{12} & \end{array}$$

(4.)

$$\begin{array}{r|r} & 63 \\ \cline{2-2} 36\frac{1}{9} & 7 \\ 28\frac{4}{21} & 12 \\ \cline{1-1} 7\frac{58}{63} & \end{array}$$

More Examples for Exerciſe.

1. From $\frac{6}{7}$ take $\frac{1}{5}$. Rem. $\frac{23}{35}$.

2. What's the Difference between $\frac{4}{5}$ and $\frac{5}{8}$? *An.* $\frac{7}{40}$.

3. How much does $\frac{11}{12}$ exceed $\frac{3}{8}$? *Anſw.* $\frac{13}{24}$.

4. Subſtract $\frac{9}{19}$ from $\frac{17}{33}$. Remains $\frac{26}{627}$.

5. Take 2 $\frac{2}{5}$ from 4 $\frac{1}{4}$. Rem. 1 $\frac{17}{20}$.

6. If 9 $\frac{1}{6}$ be taken from 20 $\frac{1}{8}$, what will remain? *Anſw.* 10 $\frac{23}{24}$.

7. From 100 $\frac{1}{4}$ take 55 $\frac{5}{6}$. Remains 44 $\frac{5}{12}$.

8. What is the Difference between 23 $\frac{1}{4}$ and 13 $\frac{3}{7}$? *Anſw.* 9 $\frac{23}{28}$.

9. From 47 deduct 33 $\frac{17}{29}$, and the Remainder is 13 $\frac{12}{29}$.

10. Take 30 from 49 $\frac{16}{23}$. Remains 19 $\frac{16}{23}$.

11. When 228 $\frac{8}{9}$ *l.* is taken from 329 $\frac{13}{16}$ *l.* what remains? *Anſwer,* 100 $\frac{133}{144}$ *l.*

12. Subſtract 5 *l.* and $\frac{9}{10}$ of $\frac{5}{6}$ *l.* from 21 $\frac{7}{8}$ *l.* and there will remain 16 $\frac{1}{8}$ *l.*

MULTIPLICATION
OF
FRACTIONS.

I. TO multiply ſimple, or compound Fractions.

Rule. Multiply the Numerators together for a new Numerator, and the Denominators for a new Denominator.

Examples.

1. Multiply $\frac{3}{4}$ by $\frac{2}{3}$. *Facit* $\frac{6}{12}$, or $\frac{1}{2}$.

Say, 3 times 2 is 6, for the Numerator; and, 4 times 3 is 12, for the Denominator: Which $\frac{6}{12}$ abbreviated is equal to $\frac{1}{2}$.

2. What is the Product of $\frac{7}{8}$ multiplied by $\frac{3}{4}$? *Anſw.* $\frac{21}{32}$.

3. If $\frac{1}{2}$ of $\frac{5}{6}$ be multiplied by $\frac{2}{5}$,

what will the Product amount to? *Anſw.* $\frac{1}{6}$

4. Multiply $\frac{3}{4}$ of $\frac{2}{3}$ by $\frac{1}{2}$ of $\frac{2}{5}$. *Facit* $\frac{1}{10}$.

Note, 1. If a whole and mixt Number be reduc'd to an improper Fraction, the preceeding Rule is general.

Note, 2. As whole Numbers, multiplied by whole Numbers, do increaſe the Product; ſo proper Fractions, multiplied by proper Fractions, do diminiſh the Product.

The following Rules will often ſerve to facilitate and ſhorten the Work of Multiplication.

II. To multiply a whole Number by a Fraction, or a Fraction by a whole Number.

Rule. Divide the Denominator (if you can) or multiply the Numerator, by the whole Number.

Or, Multiply the whole Number by the Numerator, and divide the Product by the Denominator.

Examples.

1. What is the Product of 3, multiplied by $\frac{5}{12}$? *Anſw.* 1 $\frac{1}{4}$.

Say, How many times 3 in 12? *Anſw.* 4. Thus $\frac{5}{4}$, or 1 $\frac{1}{4}$ is the Product.

Elſe ſay, 3 times 5, or 5 times 3, is 15; how many times 12 in 15? *Anſw.* 1, and 3 remains. Thus the Product is again 1 $\frac{3}{12}$, or 1 $\frac{1}{4}$.

2. Multiply 16 by $\frac{19}{48}$. *Fac.* 6 $\frac{1}{3}$.

3. Multiply $\frac{7}{8}$ by 3. *Facit* 2 $\frac{5}{8}$.

4, What is the Product of 126 multiplied by $\frac{3}{7}$? *Anſw.* 54.

III. To multiply a mixt Number by a whole Number.

Rule. If the whole Number be a Digit, then multiply the fractional Part by *Rule* 2*d*, and ſo proceed as in whole Numbers.

Or thus always, Multiply firſt the whole Number by the integral Part of the mixt Number; then by the fractional Part thereof; and collect the Sum.

Ex-

Examples.

1. Multiply 7 $\frac{5}{8}$ by 4. *Fac.* 30 $\frac{1}{2}$.

$\frac{5}{8}$ multiplied by 4, is 2 $\frac{1}{2}$, that is, $\frac{4}{8}$ and carry 2; 4 times 7 is 28, and 2 is 30. So the Product is 30 $\frac{1}{2}$.

2. Thus 612 $\frac{1}{4}$ multiplied by 9, produces 5510 $\frac{1}{4}$.

3. What is the Product ariſing from the Multiplication of 532 $\frac{1}{7}$, by 28? *Anſw.* 14900.

The Operation.

```
   532 1/7          Or thus,
    28
  ------            532 1/7
   4256            --------- 7
  1064              3725
      4            --------- 4
  ------            14900
  14900
```

In the ſecond Operation, becauſe 7 and 4 are the component Parts of 28, therefore the mixt Number being multiplied by 7, does produce 3725, and that multiplied by 4 does give the true Product.

IV. To multiply a mixt Number by a Fraction.

Rule. Multiply (as hath been taught *Rule* 2 and 1) the integral Part by the Fraction; then both Fractions together, and collect the Sum.

Or, if both Parts of the Fraction be a Digit, multiply (by *Rule* 3) the mixt Number by the Numerator, then divide the Product by the Denominator, as hereafter is taught in Diviſion.

Examples.

1. What is the Product of 11 $\frac{2}{3}$, multiplied by $\frac{3}{4}$? *Anſw.* 8 $\frac{3}{4}$.

The Operation.

11
3
———
33
4 ——— 8 $\frac{1}{4}$
$\frac{2}{3}$ of $\frac{3}{4}$ is 0 $\frac{1}{2}$
———
Facit 8 $\frac{3}{4}$

Or thus.

11 $\frac{2}{3}$
——— 3
35
4 ———
Facit 8 $\frac{3}{4}$

2. Multiply 42 $\frac{2}{9}$ by $\frac{5}{6}$. *Fac.* 35 $\frac{5}{7}$.

3. What does $\frac{1}{4}$ of 1157 $\frac{5}{16}$ amount to? *Anſw.* 289 $\frac{21}{64}$.

4. Multiply $31\frac{2}{3}$ by $\frac{2}{5}$ of $\frac{3}{4}$. *Facit* $9\frac{1}{2}$.

V. To multiply a mixt Number by a mixt Number.

Rule. Multiply the integral Parts as in whole Numbers, then each of theſe by the fractional Part of the other mixt Number; and laſtly, the two Fractions together: Which done, add the Products together.

Or, If the integral Part of one given mixt Number be a Digit, then multiply the other thereby, (by *Rule* 3.) and next, (by *Rule* 4.) multiply the ſame by the fractional Part, and collect the Sum.

Examples.

1. Multiply $40\frac{1}{3}$ by $18\frac{1}{2}$. *Fac.* $746\frac{1}{6}$.

$18\frac{1}{2}$
$40\frac{1}{3}$
720
20
$6\frac{1}{6}$
$746\frac{1}{6}$

Or more briefly thus,

$18\frac{1}{2}$
$40\frac{1}{3}$
740
$6\frac{1}{6}$
$746\frac{1}{6}$

2. Multiply $32\frac{7}{9}$ by $17\frac{2}{3}$. *Fac.* $579\frac{2}{27}$.

3. Multiply $114\frac{5}{8}$, by $9\frac{5}{7}$, and the true Product will be $1113\frac{1}{2}$.

Contractions.

I. When a Fraction is to be multiplied by a Number equal to the Denominator, the Numerator is the Product.

Examples.

1. Multiply $\frac{3}{4}$ by 4. *Facit* 3.
2. Mult. $\frac{5}{8}$ by 8. *Facit* 5.
3. If $\frac{11}{12}$ be multiplied by 12, the Product will be 11: And ſo of any other Fraction multiplied by its Denominator.

II. In ſimple or compound Fractions, when the Numerator of one and Denominator of another, can be divided by one and the ſame Number, without a Remainder, ſuch may be cancell'd, and their Quotients plac'd in their room.

Ex-

Examples.

1. Multiply $\frac{8}{9}$ by $\frac{5}{12}$. *Fac.* $\frac{10}{27}$.

$$\frac{\overset{2}{8}}{9}\times\frac{5}{\underset{3}{\cancel{12}}}=\frac{10}{27}$$

In this Example 8 and 12 being divided by 4, they quote 2 and 3, *&c.*

2. Multiply $\frac{5}{6}$ by $\frac{9}{10}$. *Facit* $\frac{3}{4}$.

$$\frac{\overset{1}{\cancel{5}}}{\underset{2}{\cancel{6}}}\times\frac{\overset{3}{\cancel{9}}}{\underset{2}{\cancel{10}}}=\frac{3}{4}$$

Here 5 and 10 divided by 5, they quote 1 and 2: Alſo 6 and 9, divided by 3, quote 2 and 3.

3. Multiply $\frac{7}{12}$ by $\frac{9}{14}$. *Facit* $\frac{3}{8}$.

4. Multiply $\frac{7}{8}$ of $\frac{4}{14}$ by $\frac{9}{10}$ of $\frac{20}{21}$, and the true Product will be $\frac{3}{14}$.

Various Examples for the Learners Exerciſe.

(1.) Multiply $\frac{3}{4}$ by $\frac{2}{5}$. *Facit* $\frac{3}{10}$.

(2.) $\frac{3}{8}$ by $\frac{2}{9}$. *Fac.* $\frac{1}{12}$.

(3.) $\frac{2}{7}$ by $\frac{7}{9}$. *Fac.* $\frac{1}{4}$.

(4.) $\frac{7}{8}$ by 4. *Fac.* 3 $\frac{1}{2}$.

(5.) 32 by $\frac{3}{8}$. *Fac.* 12.

(6.) 160 by $\frac{4}{9}$. *Fac.* 71 $\frac{1}{9}$.

(7.) 366

(7.) 366 by $\frac{5}{8}$. *Fac.* 228 $\frac{3}{4}$.

(8.) $\frac{5}{8}$ by $\frac{4}{9}$ of $\frac{3}{7}$. *Fac.* $\frac{5}{42}$.

(9.) 1 $\frac{1}{2}$ by $\frac{1}{4}$ of $\frac{1}{4}$. *Fac.* $\frac{3}{32}$.

(10.) 106 by 39 $\frac{1}{4}$. *Fac.* 4160 $\frac{1}{2}$.

(11.) 396 by 193 $\frac{3}{4}$. *Fac.* 76725.

(12.) 76 $\frac{1}{2}$ by 11 $\frac{1}{2}$. *Fac.* 879 $\frac{3}{4}$.

(13.) 531 $\frac{3}{4}$ by 12 $\frac{1}{2}$. *Fac.* 6646 $\frac{7}{8}$.

(14.) 1780 $\frac{1}{2}$. by 28 $\frac{3}{4}$. *Facit* (51189 $\frac{3}{8}$.

(15.) 1371 $\frac{1}{4}$ by 19 $\frac{1}{4}$ *Facit* (26396 $\frac{9}{16}$.

(16.) 5017 $\frac{3}{8}$ by 20 $\frac{3}{16}$. *Facit* (101288 $\frac{33}{128}$.

(17.) 56137 $\frac{3}{8}$ by 116 $\frac{5}{12}$. *Facit* (6535326 $\frac{7}{96}$.

DIVI-

DIVISION
OF
FRACTIONS.

General Rules.

1. WHen the Diviſor and Dividend are both ſimple Fractions, or reduc'd thereto.

Rule. Multiply the Numerator of the Dividend by the Diviſor's Denominator, for a new Numerator, and the Dividend's Denominator by the Numerator of the Diviſor, for a new Denominator; which new Fraction will be the Quotient required.

Examples.

1. Divide $\frac{2}{3}$ by $\frac{3}{4}$: *Facit* $\frac{8}{9}$.

2. Divide $\frac{7}{9}$ by $\frac{3}{8}$: *Facit* $\frac{56}{27}$, or $2\frac{2}{27}$.

3. Divide $\frac{4}{5}$ by $\frac{3}{4}$: *Fac.* $\frac{16}{15}$, or 1 $\frac{1}{15}$.
4. Divide $\frac{11}{12}$ by $\frac{1}{2}$: *Fac.* $\frac{22}{12}$, or 1 $\frac{5}{6}$.
5. Divide $\frac{7}{8}$ by $\frac{3}{4}$: *Fac.* $\frac{28}{24}$, or 1 $\frac{1}{6}$.

Rule II. When the Dividend and Diviſor have one common Denominator, or are reduc'd thereto; then reject the common Denominator, and divide the Numerator of the Dividend by the Diviſor's Numerator.

Examples.

1. Divide $\frac{11}{12}$ by $\frac{6}{12}$: *Facit* 1 $\frac{5}{6}$.
2. Divide $\frac{7}{8}$ by $\frac{6}{8}$: *Facit* 1 $\frac{1}{6}$.
3. Divide $\frac{3}{8}$ by $\frac{1}{4}$: *Facit* 1 $\frac{1}{2}$.
4. Divide 7 by $\frac{3}{4}$: *Facit* 9 $\frac{1}{3}$.
5. Divide 8 $\frac{3}{4}$ by $\frac{3}{4}$: *Facit* 11 $\frac{2}{3}$.

Particular Rules.

I. To divide a Fraction by an Integer.

Rule. Divide the Numerator, (if you can without a Remainder) or multiply the Denominator, by the Integer.

Examples.

1. Divide $\frac{3}{4}$ by 3: *Facit* $\frac{1}{4}$.
2. Divide $\frac{8}{9}$ by 4: *Facit* $\frac{2}{9}$.
3. Divide $\frac{5}{6}$ by 8: *Facit* $\frac{5}{48}$.
4. Divide $\frac{6}{7}$ by 9: *Fac.* $\frac{6}{63}$, or $\frac{2}{21}$.

II. To divide a whole Number by a Fraction.

Rule. Multiply the whole Number by the Denominator, and divide the Product by the Numerator.

Examples.

1. Divide 5 by $\frac{2}{3}$: *Facit* $7\frac{1}{2}$.

$\frac{2}{3}$) 5

——— 3

15

2 ———

$7\frac{1}{2}$

2. Divide 16 by $\frac{3}{4}$: *Facit* $21\frac{1}{3}$.
3. Divide 7 by $\frac{3}{8}$: *Facit* $18\frac{2}{3}$.
4. Divide 24 by $\frac{5}{12}$: *Eacit* $57\frac{3}{5}$.

III. To divide a mixt Number by a whole Number.

Rule. Divide the integral Part, as in whole Numbers, and the fractional Part, as before directed; reducing it with the Remainder (if any be) to an improper Fraction.

Examples.

1. Divide 30 $\frac{1}{2}$ by 4. *Facit* 7 $\frac{5}{8}$.

Say, How many times 4 in 30? *Anſw.* 7 times: 7 times 4 is 28, from 30, there remains 2 $\frac{1}{2}$, which in an improper Fraction, is $\frac{5}{2}$, this divided by 4, makes $\frac{5}{8}$; ſo the Quotient is 7 $\frac{5}{8}$.

$$\begin{array}{r|l} & 30\ \frac{1}{2} \\ 4 & \overline{\quad\quad} \\ & 7\ \frac{5}{8} \end{array}$$

2. Divide 19 $\frac{1}{2}$ by 3: *Facit* 6 $\frac{1}{2}$.

3. Divide 124 $\frac{3}{4}$ by 8: *Fac.* 15 $\frac{19}{32}$.

4. Divide 207 $\frac{5}{6}$ by 5: *Fac.* 41 $\frac{17}{30}$.

IV. To divide a mixt Number by a Fraction.

Rule. Multiply the mixt Number by the Denominator, and divide the Product by the Numerator of the Diviſor.

Examples.

1. Divide 8 $\frac{3}{4}$ by $\frac{3}{4}$: *Facit* 11 $\frac{2}{3}$.

$\frac{3}{4}$) 8 $\frac{3}{4}$
———4
35
3———
11 $\frac{2}{3}$

Say, 4 times 8 is 32, and 3 is 35: How many times 3 in 35? *Anſ.* 11, and 2 remains: *ergo*, the Quotient is 11 $\frac{2}{3}$.

2. Divide 35 $\frac{5}{27}$ by $\frac{5}{6}$; *facit* 42 $\frac{2}{9}$.

$\frac{5}{6}$) 35 $\frac{5}{27}$
———6
211 $\frac{1}{9}$
5———
42 $\frac{2}{9}$

Say, 6 times 5 is 30, 27 from 30, reſt $\frac{3}{27}$, or $\frac{1}{9}$, and carry 1; 6 times 5 is 30, and 1, is 31, 1 and carry 3; 6 times 3 is 18, and 3, is 21. How many times 5 in 21? *Anſw.* 4 times, and 1 remains, making 10, 10 and 1 is 11, how many times 5 in 11? *Anſw.* 2, and 1 remains: 9 times 1 is 9, and $\frac{1}{9}$ is $\frac{10}{9}$; how many times 5 in $\frac{10}{9}$? *Anſw.* $\frac{2}{9}$. So the Operation is finiſhed.

3. Divide 289 $\frac{21}{64}$ by $\frac{1}{4}$; *facit* 1157 $\frac{5}{16}$.

$\frac{1}{4}$) 289 $\frac{21}{64}$
———4
1157 $\frac{5}{16}$

Here I ſay, How many times 4 in 64? *Anſw.* 16: 16 from 21, reſts $\frac{5}{16}$, and carry 1, &c.

4. Divide $9\frac{1}{2}$ by $\frac{2}{5}$ of $\frac{3}{4}$; *facit* $31\frac{2}{3}$.

$\frac{2}{3}$ of $\frac{3}{4}$ is $\frac{3}{10}$) $9\frac{1}{2}$

——— ———10

95

3 ———

$31\frac{2}{3}$.

V. To divide a mixt Number by a mixt Number.

Rule. Multiply the Dividend and Diviſor by the Denominator of the Diviſor; then divide as before directed by *Rule* 3 and 4.

Examples.

1. Divide $23\frac{3}{5}$ by $2\frac{3}{4}$; *fac.* $8\frac{32}{55}$.

In this Example, I multiply $23\frac{3}{5}$ by 4, and the Product is $94\frac{2}{5}$, to be divided by 11 (the Product of $2\frac{3}{4}$ by 4) according to the third *Rule*.

$2\frac{3}{4}$) $23\frac{3}{5}$

——— ———4

11) $94\frac{2}{5}$

———

facit $8\frac{32}{55}$.

2. Divide $113\frac{1}{8}$ by $4\frac{1}{2}$; *fac.* $25\frac{5}{36}$.

3. Divide $746\frac{1}{6}$ by $18\frac{1}{2}$; *fac.* $40\frac{1}{3}$.

4. Divide $579\frac{2}{27}$ by $32\frac{7}{9}$; *fac.* $17\frac{2}{3}$.

5. Divide $1113\frac{1}{2}$ by $9\frac{5}{7}$; *facit* $114\frac{5}{8}$.

6. Divide $4215\frac{3}{16}$ by $24\frac{1}{8}$; *facit* $174\frac{279}{386}$.

The Operation of theſe 5 Examples are left for the Practice of the Learner.

In ſimple Fractions the Work may be often contracted thus,

Divide the Numerators, or Denominators, or both (if you can) by any Number ſo that 0 remain, then taking their Quotients in place of them, work by the firſt general Rule.

Examples.

1. Divide $\frac{12}{17}$ by $\frac{8}{5}$; *fac.* $\frac{15}{34}$.

Here 12 and 8 may be divided by 4.

2. Divide $\frac{25}{8}$ by $\frac{15}{8}$; *fac.* $\frac{5}{3}$, or $1\frac{2}{3}$.

Divide the Numerators by 5, and cancel the Denominators.

3. Divide $\frac{9}{11}$ by $\frac{6}{7}$; *facit* $\frac{21}{22}$.

4. Divide $\frac{5}{12}$ by $\frac{7}{8}$; *facit* $\frac{10}{21}$.

5. Divide $\frac{15}{22}$ by $\frac{5}{6}$; *facit* $\frac{9}{11}$.

6. Divide $\frac{3}{4}$ by $\frac{9}{10}$; *facit* $\frac{5}{6}$.

The induſtrious Learner may further exerciſe himſelf in dividing theſe following Examples, *viz.*

(1.) $\frac{5}{8}$ by $\frac{1}{6}$; *facit* $3\frac{3}{4}$.

(2.) $\frac{3}{10}$ by $\frac{3}{4}$; *facit* $\frac{2}{5}$. (3.) $\frac{3}{8}$ by

(3.) $\frac{3}{8}$ by $\frac{1}{4}$; *fac.* $1\frac{1}{2}$.

(4.) $\frac{1}{12}$ by $\frac{2}{9}$; *fac.* $\frac{3}{8}$.

(5.) 5 by $\frac{1}{4}$; *fac.* 20.

(6.) $1\frac{1}{4}$ by 5; *fac.* $\frac{1}{4}$

(7.) $2\frac{2}{5}$ by 6; *fac.* $\frac{2}{5}$.

(8.) $2\frac{1}{2}$ by $\frac{3}{4}$; *fac.* $3\frac{1}{3}$.

(9.) $\frac{1}{8}$ by $\frac{2}{3}$ of $\frac{1}{4}$; *fac.* $\frac{3}{4}$.

(10.) $\frac{5}{42}$ by $\frac{5}{8}$ of $\frac{4}{9}$; *fac.* $\frac{3}{7}$.

(11.) $\frac{3}{32}$ by $\frac{1}{4}$ of $1\frac{1}{2}$; *fac.* $\frac{1}{4}$.

(12.) $1\frac{1}{16}$ by $\frac{1}{2}$ of $3\frac{1}{4}$; *fac.* $\frac{17}{26}$.

(13.) 18 by $\frac{3}{7}$; *fac.* 42.

(14.) $376\frac{1}{4}$ by $\frac{3}{5}$; *fac.* $627\frac{1}{12}$.

(15.) $6646\frac{7}{8}$ by $12\frac{1}{2}$; *fac.* $531\frac{3}{4}$.

(16.) $51189\frac{3}{8}$ by $28\frac{3}{4}$; *fac.* $1780\frac{1}{2}$.

(17.) $26396\frac{9}{16}$ by $19\frac{1}{4}$; *fac.* $1371\frac{1}{4}$.

(18.) $101288\frac{33}{128}$ by $20\frac{3}{16}$; *fa.* $5017\frac{3}{8}$

(19.) $201399\frac{73}{128}$ by $30\frac{5}{8}$; *fa.* $6576\frac{5}{16}$

(20.) $6535326\frac{7}{96}$ by $116\frac{5}{12}$; *f.* $56137\frac{3}{8}$

Having thus copiouſly inſiſted on vulgar Fractions after a new Method, I ſhall briefly ſay ſomething to Decimals, and then proceed to what is more practical.

OF

DECIMAL FRACTIONS.

A Decimal Fraction differs from a vulgar herein, that the Denominator of a Decimal is always 10, or ſome Power of 10, *viz.* 100, 1000, 10000, *&c.* therefore 'tis eaſily known without expreſſing it.

Decimals, whether they ſtand alone, or be join'd with whole Numbers, have uſually a Comma or Point before them, to diſtinguiſh them from Integers; thus, .5; .75; 12,59, *&c.* which Comma or Point poſſeſſes the like Place as the Unit in the Denominator wou'd, if it were expreſt; thus .7 is $\frac{7}{10}$, the Point, being in the Tens Place, denotes the Denominator to be 10; .23 is $\frac{23}{100}$, .098 is $\frac{98}{1000}$, *&c.*

In Decimals the Value of every Figure decreaſes by a tenfold Proportion, from the Units Place towards the right Hand.

Cyphers at the right Hand of Decimals are of no Value; but at the left Hand they diminiſh the Value of the other Figures join'd with them; thus .5000 is but .5, .05 is $\frac{5}{100}$, .006 is $\frac{6}{1000}$, *&c.*

How to reduce vulgar Fractions into Decimals of the ſame Value, or infinitely near, was taught before.

To find the Value of any Decimal.

Rule. Multiply the Decimal given, by the known Parts of the next inferior Denomination, and prick, from the right Hand of the Product, ſo many Places as the Decimal conſiſts of; then multiply the remaining Decimals by the known Parts of the next lower Denomination, and prick off as before, *&c.* and the Figures on the left Hand of the Points will be the Parts required.

Examples.

1. What is the Value of .9184 of a *l.* Sterling? *Anſw.* 18 *s.* 4 $\frac{1}{4}$ *d.*

D.4 .9184

.9184
—— 20
s. 18.3680
—— 12
d. 4.416
—— 4
q. 1.664

2. What is the Value of .777 of a *l.* Sterling? *Anſw. l.* 0 : 15 : 6½ *d.* very near.

.777
20
——
15.540
—— 12
6.48
—— 4
1.92

Note, The Value of a Decimal of a *l.* Sterl. may be found by *Inſpection* thus: double the Figure ſtanding next the Point in the Decimal given for Shillings; if the next Figure be 5, or more add 1 *s.* to the Product; the ſecond Figure (if under 5) or its Exceſs (if above 5) join'd with the third Figure are ſo many Farthings; which if above 20, make leſs by 1, and if above 40, leſs by 2.

The reckoning the ſecond and third Places from the Prick ſo many Farthings, ſuppoſes 1000 Farthings in a Pound, and there being but 960, it can't be exact; but ſerves well enough for ordinary Practice, if Allowance be made as abovementioned.

3. What's the Value of .1462 of a Hund. Weight? *Anſ.* 16.3744 *lb.*

4. What is the Value of .912 of a *lb. Troy*? *Anſ.* 10 *oz.* 18 *d.w.* 21.12 *gr.*

ADDITION
OF
DECIMALS.

SET down the propoſed Numbers, Units under Units, Tens under Tens, and Parts under Parts of like Value; then add all up, as if they were whole Numbers of one Denomination, ſeparating ſo many Decimal Places in the Total, as are in any of the given Numbers.

Examples.

.976	10.09	12.119
.703	.785	4.9
.098	1.513	.312
.87	.42	25.07
.9103	7.069	.196
3.5573	19.877	42.597

SUBSTRACTION

OF

DECIMALS.

HAving plac'd the Numbers as directed in Addition, work as in whole Numbers.

Examples.

From	.982	42.106	11.0710
Take	.3764	11.79	4.7619
Rem.	.6056	30.316	6.3091

MUL-

MULTIPLICATION
OF
DECIMALS.

PLace the Factors, and work as in whole Numbers; but obſerve to ſeparate ſo many Places of Decimals on the right Hand of the Product as are in both the Factors, and if there be not ſo many, the Defect muſt be ſupplied with a Cypher, or Cyphers, towards the left Hand.

Examples.

Mult. 4.29	.046
By .57	.42
3003	92
2145	184
Fac. 2.4453	.01932

DIVISION OF DECIMALS.

THis is the ſame with that of whole Numbers till the Work be done: Then prick off ſo many Decimal Places in the Quotient as the Dividend has more than the Diviſor: If there be not ſo many, ſupply the Defect with Cyphers towards the left Hand.

Examples.

1. Divide 2.4453 by .57; *fac.* 4.29.

.57) 2.4453 (4.29
165
513
―――
0

2. Divide .01932 by .42; *fac.* .046.

.42) .01932
―――
.046 252
―――
0

Note, Sometimes it will be neceſſary to place Cyphers to the right Hand of the Dividend, and then conſider how many Decimal Places you would have in the Quotient, and how many there are in the Diviſor; and make ſo many in the Dividend as in both.

Select Queſtions.

1. What is the Value of $\frac{1\ 1\ 5\ 5}{1\ 8\ 4\ 8}$ of a Pound Sterling? *Anſw.* 12*s.* 6 *d.*

2. How many Shillings are in $\frac{2\ 6\ 9\ 4\ 3}{3\ 5\ 9\ 2\ 4}$ *l.*? *Anſw.* 15 *s.*

3. How much is $\frac{3}{4}$ more than $\frac{2}{3}$? *Anſw.* $\frac{1}{12}$.

4. What Part of a Shilling is $\frac{3}{4}$ of a Peny? *Anſw.* $\frac{1}{16}$

5. *A* has 27 $\frac{1}{2}$ *l.* *B* has 11 $\frac{1}{4}$ *l.* and C has half ſo much as both: How much have they all? *Anſ.* 58 $\frac{1}{8}$ *l.*

6. How much is 2 $\frac{1\ 5}{3\ 2}$ *l.* $\frac{3}{4}$, $\frac{1\ 9}{3\ 2}$, $\frac{5}{8}$, $\frac{9}{16}$, and $\frac{1}{8}$ *l.*? *Anſw.* *l.* 5 : 2 : 6 *d.*

7. What's the Difference between $\frac{5}{6}$ *l.* and $\frac{7}{8}$ *l.*? *Anſw.* 10 *d.*

8. Borrowed 26 $\frac{1}{4}$ *l.* paid 8 $\frac{4}{5}$ *l.* what remains due? *Anſw.* 17 *l.* 9 *s.*

9. If the Groſs Weight of 3 Bales be $705\frac{3}{8}$ *lb.* and the Tare be $12\frac{3}{4}$ *lb.* *per* Bale, What's their Neat Weight? *Anſw.* $667\frac{1}{8}$ *lb.*

10. What muſt be paid for $1\frac{1}{2}$ *lb.* at $9\frac{3}{4}$ *d. per* Pound? *Anſw.* $14\frac{1}{2}$ *d.* the exact Amount is $14\frac{5}{8}$ *d.*

11. What does $27\frac{1}{2}$ Yards of Cloth amount to, at $3\frac{1}{2}$ *s.* the Yard? *Anſw.* 4*l.* 16*s.* 3*d.*

12. How much *Holland*'s Money muſt be paid for a Bill of 250*l.* 10*s.* ſterling, Exchange at 37*s.* 6*d. Flem. per l.*? *Anſw.* 2818 *gl.* $2\frac{1}{2}$ *ſtiv.*

13. If $\frac{3}{16}$ of a Ship coſt $235\frac{1}{2}$ *l.* what is the whole Ship valued at? *Anſw.* 1256 *l.*

14. How many Pound Sterling does a Bill of *l.* 471 : 17 : 6 *d. Flem.* amount to, at $37\frac{3}{4}$ *s. per l.*? *Anſw.* 250 *l.* Sterling.

15. Six Pieces of Cloth, containing, $55\frac{3}{4}$, $50\frac{3}{16}$, $49\frac{1}{2}$, $77\frac{5}{8}$, $54\frac{1}{4}$, & $44\frac{3}{8}$ Ells, being ſold for *l.*66:6:9*d.* What coſt each Ell? *Anſw.* 4 *s.*

16. What Number being multiplied by $\frac{3}{5}$, will produce $25\frac{2}{5}$? *Anſ.* $42\frac{1}{3}$.

Some

Some Critical Obſervations on Multiplication and Diviſion.

I. THE Product will be always the ſame, whether you begin to multiply at the firſt, or laſt, or any intermediate Place of the Multiplier, provided the other particular Products be ſet out towards the right, or left Hand, or both, from that you begin with, as the Figures ſtand in the Multiplicator.

This is evident by the following Example and Operations.

Multiply 897 by 435; *facit* 390195.

(1.)	(2.)	(3.)
897	897	897
435	435	435
4485	3588	2691
2691	2691	4485
3588	4485	3588
390195	390195	390195

II. If any Figure in the Multiplier be an Unit; ſet all the particular Products, made by the other Figures in the Multiplicator, out towards the right, or left Hand, or both, as they ſtand from the ſaid Unit; and to theſe add the Multiplicand.

Examples.

1. Multiply 3968 by 315; *facit* 1249920.

The Operation.

3968×315
19840
11904
Prod. 1249920

2. Multiply 97020012 by 321; *facit* 31143423852.

The Operation.

97020012×321
194040024
291060036
Prod. 31143423852

3. Multiply 975 by 104; *facit* 101400.

975×104
3900

Prod. 101400

In this laſt Example, becauſe 0 is between 1 and 4, therefore I ſet the Product of 975 by 4 two Places out towards the right Hand.

III. Of two Factors, you may divide either by any Number you pleaſe; then multiply the other by the Diviſor, and the Product by the Quotient; if ought remain, multiply the Multiplicand thereby, and collect the Sum.

To illuſtrate this, I ſhall take the Examp. given on the firſt Obſervat. and work it ſeveral ways as follows.

(1.) 897×435
5
4485 87
87
35880
31395
Fac. 390195

(2.) 897×435
9
8073 ×48-3
×
32292
64584
2691
Prod. 390195

(3.) 435

```
    (3.)                    (4.)
  435×897               435 × 897
———8———                 ——12———
3480--112--1            5220    74--9
 3480                   ——— ×
  6960                  3654
   435                   2088
———                        3915
390195                   ———
                         390195
```

IV. If any Number be multiplied or divided continually by the component Parts of the Multiplier or Diviſor; you will, at laſt, have the true Product or Quotient.

An Example will make this plain.

```
75) 32025 ( 427                 427
     202    ———75               ——5
      525   2989                2135
     ———     2135               ——5
        0   ———                 10675
            32025               ——3
                                32025
                              3 ———
                                10675
                              5 ———
                                2135
                              5 ———
                                427
```

V. When you have two Columns of Numbers, whereof the Product of the one is to be divided by the Product of the other; it will often much abbreviate the Work, if, firſt, any Number in one Column be divided by one of the Numbers in the other, and both expung'd; or if one Number in each Column be divided by the ſame Quantity, and their Quotients taken in Place of them.

Example. Let 35, 21, 42, and 81, be given, to be continually multiplied together, and their Product being 2500470, to be divided by 945, the Product ariſing from the continual Multiplication of 3, 5, 9 and 7; and the Quotient will be 2646: But the Work may be abbreviated as follows.

Since each Number in the firſt Column is an aliquot Part of another in the ſecond, they may be all cancell'd, as you ſee: And the Quotients being conti-

$$\begin{array}{lcll}
\cancel{3} & \text{———} & \cancel{35}. & 7\\
\cancel{5} & \text{———} & \cancel{21}. & 7\\
\cancel{9} & \text{———} & \cancel{42}. & 6\\
\cancel{7} & \text{———} & \cancel{81}. & 9
\end{array}$$

$$\begin{array}{rr}
6\times 9 = & 54\\
 & \underline{}\,7\\
 & 378\\
 & \underline{}\,7\\
\textit{fac.} & 2646
\end{array}$$

continually multiplied, the true Quotient is produc'd.

Theſe Obſervations may be of great Uſe to the ingenious Acountant, eſpecially in Multiplication and Diviſion of Numbers, of divers Denominations; which I ſhall now explain.

Multiplication of Money, Weight, and Meaſure.

TO make this more intelligible I ſhall propoſe a Queſtion of the Golden Rule, which I find in *The Merchant's Magazine*, and work the ſame three Ways; adding ſuch Explication to each as may help the Learner to underſtand and work other Queſtions of like Nature compendiouſly.

Queſt. At 14 *l.* 10 *s.* 6 *d.* *per* Bag of Hops, what coſt 55 Bags? *Anſ.* 798 *l.* 17 *s.* 6 *d.*

The firſt Operation.

l.	s.	d.	
14 :	10 :	6	330
		55	12
70 :	50 :	30	27-6
70 :	50 :	30	550
fac. 798 :	17 :	6	577
			20
			28-17

Explication.

Say, 5 times 6 is 30 *d.* 5 times 10 is 50 *s.* and 5 times 4 is 20, 0 and carry 2; 5 times 1 is 5, and 2 is 7: ſo you have 70 *l.* 50 *s.* and 30 *d.* for the firſt particular Product: the other Figure in the Multiplier being alſo 5, will produce the ſame Numbers but of 10 times greater Value, becauſe it ſtands in the ſecond Place, or Place of Tens, therefore are ſet out one Place farther toward the left Hand. Now there is no more to do, but add up, and divide by 12, and by 20, *viz.* 330 divided by 12, quotes 27 *s.* and 6 *d.* 550 added to 27 gives 577, which divided by 20, quotes 28 *l.* and 17 *s.* 28 added to 770 gives 798 *l.*

798 *l.*; *Ergo*, the Amount of 55 Bags, at the propoſed Price, is *l.* 798 : 17 : 6 *d.*

Tho' this might be ſufficient to the Ingenious, yet becauſe it may ſeem ſtrange and unuſual to many, I ſhall work and explain the ſame Example two Ways more, and inſert two other Examples.

The ſecond Operation.

l. *s.* *d.*
14 : 10 : 6
———————— 55
72 : 12 : 6
72 : 12 : 6
————————
Fac. l. 798 : 17 : 6 *d.*

Explication.

Mind well that the firſt four Critical Obſervations may be applied to Numbers of divers Denominations: by the firſt of which it appears to be a Thing indifferent, what Figure of the Multiplier the Multiplicand be firſt multiplied by. And therefore I begin here with the 5 in the ſecond Place, ſaying, 5 times 6 is 30, that is 6 *d.* and carry 2 *s.* 5 times 10 is 50, and 2, is 52, *i. e.* 12 *s.* and carry 2 *l.* 5 times 4 is 20, and 2 is 22, 2 and carry 2; 5 times 1 is 5, and 2 is 7: then repeating the ſame, I ſet the Product out one Place toward the right Hand, and add up, ſo the Work is done.

The third Operation.

l. *s.* *d.*
14 : 10 : 6 × 55
———— 9 —
130 : 14 : 6 -×- 6 --1
784 : 07 : 0
14 : 10 : 6
Fac. l. 798 : 17 : 6 *d.*

Explication.

According to the third Obſervation, I divide 55 by 9, and multiply the other Factor, *viz.* 14 *l.* 10 *s.* 6 *d.* thereby, then I multiply the Product by the Quotient $6\frac{1}{9}$, *&c.*

Examp. 2. If 1 C. 3 *qrs.* $17\frac{3}{4}$ *lb.* (of any Thing) be ſold for 20 *s.* How much thereof muſt be given for 39 *l.* 10 *s.* at that Rate? *Anſwer,* 3 *T.* 15 C. 1 *qr.* $15\frac{1}{8}$ *lb.*

The Operation.

```
C.       Q.     lb.     oz.
1     :  3   :  17   :  12
———————————————————————————39½
5     :  1   :  53   :   4     715
15    :    3 :  159  :  12   4———
           3 :   22  :  14    178¼
————————————————————————————1
3.: 15  :  1  :  15  :   2   7 ————
                               25-15
                               16
                               ——
                               41
```

Say, 3 times 12 is 36, 4 and carry 2; 3 times 7 is 21, and 2 is 23, 3 and carry 2; 3 times 1 is 3, and 2 is 5; 3 times 3 is 9, 1 and carry 2; 3 times 1 is 3, and 2 is 5: Again multiply (after the ſame manner) the Multiplicand by 9, ſetting out the Product one Place towards the right Hand: then take the half of the ſaid Multiplicand, and add all together, and 'tis done.

Examp. 3. Suppoſe a Fleet of Tranſport Ships, conſiſting of 39 Sail, which (among other Things) hath Wine Ship'd Aboard as follows, *viz.* 38 of them has each 53

Tuns and 2 Hhds, and the other ½ ſo much as one of the reſt; I demand how much Wine was loaded on Board that Fleet? *Anſw.* 2059 *T.* 3 *Hhds.*

The Operation.

T.	*Hhds.*	
53	: 2	
		38½
160	: 2	
428	: 0	
26	: 3	
2059	: 3	

Say, 3 times 2 is 6, 2 and carry 1; 3 times 3 is 9 and 1 is 10, 0 and carry 1; 3 times 5 is 15, and 1 is 16: Next, 8 times 2 is 16, (mind to ſet the Product as has been taught,) 0 and carry 4; 8 times 3 is 24, and 4 is 28, 8 and carry 2; 8 times 5 is 40, and 2 is 42: Then take the half of the Multiplicand, and collect the Sum.

Diviſion of Money, Weight, and Meaſure.

HEre is nothing elſe to do, but to divide the Quantity in the higheſt Denomination by the Diviſor, then reduce the Remainder (as uſual in *Reduction Deſcending*) to the next inferior Denomination, taking in what is there found; and again divide as before, *&c.*

I ſhall take the Products of the three Examples foregoing, to illuſtrate this Rule, and prove the Operations.

Example 1.

If 55 Bags of Hops coſt 798 *l.* 17 *s.* 6 *d.* what is the Price of each Bag, at that Rate? *Anſwer* 14 *l.* 10 *s.* 6 *d.*

55)

```
      l.    s.   d.   l.   s.  d.
55) 798 : 17 : 6 (14 : 10 : 6
    248
    ---
     28
     20
    ---
    577
    ---
     27
     12
    ---
    330
    ---
      0
```

Explicat. 798 being divided by 55, there quotes 14, and 28 remains, which multiplied by 20 and the 17 *s.* added, does make 577, that divided by 55 quotes 10, and there remains 27, which being multiplied by 12, makes, with the 6 *d.* in the Dividend, 330 *d.* and that divided by 55, gives 6 *d.* So the Quotient is *l.* 14 : 10 : 6 *d.*

Otherwiſe thus,

```
          l.    s.   d.
         798 : 17 : 6
      5 ------------
         159 : 15 : 6
     11 ------------
Facit l. 14 : 10 : 6
```

Explicat. According to the 4th Obſervation, 5 and 11 being the component Parts of 55, I firſt divide the Dividend by 5, and then the Quotient thence ariſing by 11, as follows: How many times 5 in 7? once, and 2 remains, making the 9, 29: How many times 5 in 29? 5 times, and 4 remains, making the 8, 48: How oft 5 in 48? 9 times, and 3 remains, making 60 *s.* thereto adding 17 the Sum is 77; which divided by 5, quotes 15, and 2 remains, making 24, 24 and 6 is 30; how many times 5 in 30? 6; and 0 remains. So the Quotient is 159 *l.* 15 *s.* and 6 *d.* This I divide by 11 in like manner, ſaying, How many times 11 in 15? *Anſ.* 1, and 4 remains, making the 9, 49; how often 11 in 49? 4 times, and 5 remains, being 100 *s.* thereto I add 15, and ſay, How many times 11 in 115? 10 times, and 5 remains, making 60 *d.* 60 and 6 is 66, how oft 11 in 66? 6 times, and the Operation is finiſhed.

If this manner of Operation ſeem difficult at firſt, yet Practice will make it eaſy. Whoever will accuſtom himſelf thereto; multiplying and dividing any compound

Number by any of the Digits, by 12, and by 16, ſhall doubtleſs find the Advantage to recompence his Pains, if he has many Accounts to caſt.

Examp. 2. If 3 *T.* 15 *C.* 1 *qr.* 15 *lb.* 2 *oun.* coſt 39 *l.* 10 *s.* how much for 20 *s.* at that rate? *Anſw.* 1 C. 3 *qrs.* 17 *lb.* 12 *oun.*

```
  l.     T.   C.   qrs.  lb.  oz.   C. q. lb. oz
39½)  3 : 15 : 1 : 15 : 2 ( 1:3:17:12
————————————————————————————— 2
 79  )7 : 10 : 3 :    2 : 4
      20
     ————
     150
     ————
      71
       4
     ————
     287
     ————
      50
      28
     ————
    1402
     612
     ————
      59
      16
     ————
     948
     ————
       0
```

Here I firſt multiply the Dividend and Diviſor by 2, to take away the Fraction from the Diviſor; then reduce the 7 Tuns to Hundreds, as is uſual, taking in the 10 under the Line, and divide by 79: Next I multiply 71 that remains by 4, taking in the 3 *qrs.* and again divide by 79: after that I multiply 50 the Remainder, by 28, (or rather 28 by 50) taking in the 2 *lb.* and again divide by 79: In the next place I multiply 59 that remains by 16, taking in the 4 *oz.* and divide as before, ſo the Operation is finiſh'd.

Examp. 3. Suppoſe 2059 Tuns and 3 Hogſheads of Wine to be ſhipt on Board 39 Sail of Merchant Men, 38 of which Ships have each an equal Quantity, and the other, one half of the ſaid Quantity: How much Wine is put on Board each Ship? *Anſw.* 53 ½ Tuns on Board each, except one, that has but 26 ¾ Tuns.

```
          T.     hhds.
38½) 2059   :   3
———— ————— ——2   T.  hhds.
 77--)4119  :   2 (53  :  2
       269        2————  —
        38          26  :  3
         4
       154
         0
```

If the preceeding Examples and Operations be well underſtood, this will need no Explication.

The Operation may be alſo thus.

```
            T.    hhds.
  38½ ) 2059 : 3
 ----------------- 2
  77--) 4119 : 2
7 ----------------
  11---) 588 : 2
      11 ---------
          53 : 2
        2 -------
          26 : 3
```

Queſtions for the Learners Practice.

1. IF $\frac{2}{5}$ of $\frac{3}{4}$ of a Ship be valued at *l.* 147 : 11 : 3 *d.* What is the whole Ship worth? *An. l.*491:17:6*d.*

The compound Fraction reduced to a ſimple, is $\frac{3}{10}$, *ergo,* multiply by 10, and divide by 3.

2. Admit one has a Sum of

Money to diſtribute equally among 17 Perſons, whereof each Man's Share comes to *l.* 218 : 12 : 4 *d.* What is the Sum? *Anſw.* 3716 *l.* 9 *s.* 8 *d.*

The Operation.

	l.	*s.*	*d.*
	218 :	12 :	4 × 17
	1530 :	6 :	4
Fac. l.	3716 :	9 :	8 *d.*

According to Obſervation 2d, I only multiply by 7, ſaying, 7 times 4 is 28, 4 and carry 2; 7 times 12 is 84, and 2 is 86, 6 and carry 4; 7 times 8 is 56, and 4 is 60, 0 and carry 6; 7 times 1 is 7, and 6 is 13, 3 and carry 1; 7 times 2 is 14, and 1 is 15. Then add, and 'tis done.

3. What Sum of Money will ſerve to be divided equally amongſt 84 Men, each to have 612 *l.* 9 *s.* 10 *d.* *Anſw.* 51449 *l.* 6 *s.*

4. Suppoſe one has 3716 *l.* 9 *s.* 8 *d.* to divide equally among 17 Perſons; how much muſt every one of 'em have thereof? *Anſwer* 218 *l.* 12 *s.* 4 *d.*

5. If 51449 *l.* 6 *s.* be equally diſtributed unto 84 Families, what does the Share of each Family amount to? *Anſw.* 612 *l.* 9 *s.* 10 *d.*

6. At 5 *l.* 7 *s. per* C. Wt. what coſt 129 C. weight? *Anſw.* 690 *l.* 3 *s.*

7. What is to be paid for 74 C. at 11 *l.* 12 *s.* 6 *d. per* C.? *Anſwer*, 860 *l.* 5 *s.*

8. If 12 Bags of Cotton-wool coſt 184 *l.* what will 17 Bags coſt at that Rate? *Anſw.* 260 *l.* 13 *s.* 4 *d.*

This is the 3d Example of the Golden Rule in *The Merchant's Magazine*; which I work thus,

```
     B.           l.             B.
     12 ——————— 184 ——————————— 17
12 ——————— ——————— ———————      :
      1 ——————— 15 : 6 : 8 ×
               107 : 6 : 8
          ————————————————————
      Fac. l. 260 : 13 : 4 d.
```

9. What is the exact Amount of 24 C. 3 *qrs.* 16 *lb.* of Currants at 2 *l.* 14 *s.* the C. weight? *Anſwer*, 67 *l.* 4 *s.* 2$\frac{4}{17}$ *d.*

The Operation.

	l.	s.	d.
	2	14	
			6
	16	4	
			4
qrs.	64	16	
2, is ½ . . .	1	7	
1, . . ¼ . . .	0	13	6
14 *lb.* ⅛ . . .	0	6	9
2 is 1/7 of 14 . .	0	0	11 4/7
Facit l.	67	4	2 4/7 *d.*

10. At 4 *l.* 5 *s.* 2 *d. per C.* what coſt 34 *C.* 3 *qrs.* 18 *lb.* of Tobacco? *Anſw.* 148 *lb.* 13 *s.* 2 ¾ *d.*

	l.	s.	d.		C.	Q.	lb.
	4	5	2	—	34	3	18
			2				
	8	10	4	. .	17	1	23
	59	12	4				
¼ . .	2	2	7				
⅛ . .	1	1	3 ½				
1/16 . .	0	10	7 ¾				
1/7 of ⅛	0	3	0 ½				
Facit l.	148	13	2 ¾				

11. What comes the Commiſſion of 642 *l.* 11 *s.* to, at $3\frac{1}{2}$ *per Cent.*? *Anſw.* 22 *l.* 9 *s.* $9\frac{1}{4}$ *d.*

l. *s.*
642 : 11
——— $3\frac{1}{2}$
1927 : 13
321 : 5 : 6
22|48 : 18 : 6
|20
9|78
|12
9|42

12. How many Guilders may be given for 95 Guineas, at 11 *gl.* 15 *ſtiv.* *per* Piece? *Anſ.* *Gl.* 1116:5:

gl. *ſt.*
11 : 15 × 95
——— 5 ——
58 : 15 19
528 : 15
Fac. Gl. 1116 : 5

13. How many *l.* Sterl. will 846 Dollars amount to, at 4 *s.* 6 *d.* *per* Dollar? *Anſw.* 190 *l.* 7 *s.*

If the Learner underſtands well all that goes before; what follows will not be difficult.

My Purpoſe being to inſiſt a little on what concerns Trade and Accounts, in Uſe amongſt Merchants, and ſuppoſing my Reader to underſtand the Rule of Three, Direct and Inverſe, both ſingle and double, I ſhall paſs by theſe, with Practice, Allegation, Poſition, and Progreſſion, ſeeing ſeveral Authors treat of theſe very well.

I begin with *Fellowſhip.*

FEllowſhip is Single or Double.

Single Fellowſhip, or Fellowſhip without Time, is when the Stocks propounded are ſingle Numbers, having no Relation to Time.

Double Fellowſhip, or Fellowſhip with Time, is when each Stock has Relation to a particular Time.

In the former, add together the Stocks, then ſay;

As the Total of all the Stocks, is to the whole Gain or Loſs: So is each Man's particular Stock, to his reſpective Gain or Loſs.

In the latter, Multiply each particular Stock by its reſpective Time, then proceed with the Products as with the particular Stock in the Single Rule.

Examples.

Examp. 1. Three Perſons make a Joint-Stock; *A* puts in 250*l.* *B* 150*l.* and C 100 *l.*; now they gain 100*l.* What is each Man's Share thereof? *Anſwer*, The Share of *A* is 50 *l.* of *B*, 30 *l.* and of *C*, 20 *l.*

l.	*l.* *l.* *l.*
A, 250	$5\cancel{00}$—$1\cancel{00}$—250
B, 150	5——
C, 100	50 for *A.*
——	*l.* *l.* *l.*
500	5—1—150
l.	5——
A, 50	30 for *B.*
B, 30	*l.* *l.* *l.*
C, 20	5—1—100
——	5——
100 *l.* Proof.	20 for C.

Ex. 2. Three Merchants, *A*, *B*, and C, ſent a Ship to Sea with 108

Tuns of Wine; whereof 48 Tuns pertain'd to *A*, 36 to *B*, and 24 to *C*. Now ſuppoſing this Ship to fall amongſt Privateers, who took out of her 45 Tuns of the ſaid Wine, and then let her paſs to her Port: I demand how much each Mercht. muſt ſuſtain of the Loſs, according to the Rate of his Adventure? *Anſ.* *A*, 20; *B*, 15; and *C*, 10, Tuns.

$$\begin{array}{ll}
 & T. \\
A, & 48 \\
B, & 36 \\
C, & \underline{24} \\
 & 108-45 \\
9 & \overline{} \\
 & 12-5
\end{array}
\qquad 12 : 5 :: \left\{\begin{array}{l}48 : 20 \\ 36 : 15 \\ 24 : \underline{10}\end{array}\right.$$

Proof 45 *T.*

Ex. 3. A Man on his Deathbed being Debtor to *A*, 500 *l.* and to *B*, 900 *l.* left but 1100 *l.* between them; how much thereof ſhou'd each Creditor have? *Anſ.* *A*, 392$\frac{6}{7}$ *l.* and *B*, 707$\frac{1}{7}$ *l.*

Ex. 4. Three Merchants made a Joint-Stock, wherewith they traded, and gain'd 630 *l.* *A* ſtocked in 460 *l.* *B*, 630 *l.* and *C* put in 800 *l.* I demand each Man's Share of the ſaid Gain, proportionable to his Stock?

Anſw. The Share of $\begin{cases} A\text{, is } 153\frac{1}{3} \\ B\text{, is } 210 \\ C\text{, is } 266\frac{2}{3} \end{cases}$

Ex. 5. Three Merchants, *A*, *B*, and *C*, entred Partnerſhip: *A* put into the common Stock 364 *l.* *B*, 482 *l.* and *C* laid in 500 *l.* By Traffick, they gain 867 *l.* What is each Merchant to have of the ſaid Gain? *Anſw.* *A*, *l.* 234:9:$3\frac{1}{4}$ *d.* *B*, *l.* 310:9:5 *d.* and *C* *l.* 322:1:$3\frac{3}{4}$ *d.*

Note, The Fractions of a Peny are, $\frac{177}{673}$, $\frac{31}{673}$, and $\frac{465}{673}$.

How to value the Remainders of a higher Denomination, in the known Parts of Coin, *&c.* was taught before. See the 6th Rule of Reduction of Fractions, and Diviſion of Money, Weight, and Meaſure.

Ex. 6. Three Merchants made a Joint-Stock; *A* put in 175 *l.* 12 *s.* *B*, *l.* 214 : 19 : 4 *d.* and *C*, *l.* 150 : 11 : 9 *d.* thereby they gain *l.* 209 : 11 : 4 *d.* What does each Man's

Share of the ſaid Gain amount to? *Anſwer,*

		l.	*s.*	*d.*
The Share of	*A*, is	68	0	$0\frac{81981}{125877}$
	B, is	83	4	$11\frac{58649}{125877}$
	C, is	58	6	$3\frac{119121}{125877}$
				2
Proof		*l.* 209	11	4 *d.*

Inſtead of theſe Fractions, may be reckoned, for *A*, $\frac{3}{4}$ *d.* for *B*, $\frac{1}{4}$ *d.* and for *C*, 1 *d.* which is near enough.

Ex. 7. One owing 1539 *l.* 10 *s.* to ſeveral Perſons, *viz.* to *A*, 556 *l.* to *B*, 403 *l.* to *C*, 356 *l.* 10 *s.* and to *D*, 224 *l.* has no more but 556 *l.* 15 *s.* to ſatisfy his Creditors with; What muſt each of them have thereof? *Anſw. A* may receive *l.* 201 : 1 : 5$\frac{3}{4}$, *B*, *l.* 145 : 14 : 10; *C*, *l.* 128 : 18 : 6$\frac{1}{4}$ and *D*, *l.* 81 : 0 : 2.

The Remainders are, 2137, 458, 642, and 2921; the common Denominator being 3097; together they make 2 *d.*

Note, In this Example, there is no need to reduce any of the Terms to Shillings and Pence, (as in *Example*

ample 6. muſt be done) for if the firſt two Terms be multiplied by 2, the Products will be 3079, and 1113$\frac{1}{2}$; ſo theſe may be uſed in the Operation; which, for Brevity's ſake, I omit.

There are other Ways to work Queſtions of this Nature, more ſpeedily than the common Way according to the Rule; but not always with the ſame Exactneſs.

To contract the Work, when there are many Creditors, you may find what each Pound muſt have, either by vulgar or decimal Arithmetick, then caſt up for each Man; or elſe, find firſt what 100*l.* muſt have, then how much each Creditor is to receive.

*Ex.*8. One owes to *A*, 420*l.* 10*s.* to *B*, 379*l.* 16*s.* to *C*, 764*l.* 18*s.* to *D*, 497*l.* 12*s.* to *E*, 538*l.* 4*s.* and to *F*, 256*l.* 10*s.* and has but 714*l.* 7*s.* 6*d.* to pay his Debts withal; How much of that muſt each of his Creditors have? *Anſwer*, *A* muſt have *l.* 105 : 2 : 6*d.* *B*, *l.* 94 : 19*s.* C, *l.* 191 : 4 : 6*d.* *D*, 124*l.* 8*s.* *E*, *l.* 134

l. 134 : 11 *s.* and *F*, *l.* 64 : 2 : 6 *d.* The Sum of the Debts is 2857 *l.* 10 *s.* therefore multiply the ſame, and what is to be divided among the Creditors by 2, and you'll have 5715, for a Diviſor, and 1428 $\frac{3}{4}$, for a Dividend, this multiply by 20, then divide, and there quotes exactly 5 *s.* for each Pound: Therefore each Creditor muſt be ſatisfied with $\frac{1}{4}$ Part of what was due to him.

Ex. 9. Suppoſe one owes to ſeveral Perſons 1512 *l.* 4 *s.* as follows, *viz.* to *A*, *l.* 356 : 17 : 6 *d.* to *B*, *l.* 279 : 8 : 4 *d.* to *C*, *l.* 247 : 7 : 4 *d.* to *D*, *l*, 192 : 16 : 4 *d.* to *E*, *l.* 164 : 12 : 10 *d.* to *F*, *l.* 146 : 13 : 6 *d.* and to *G*, 124 : 8 : 2 *d.* who, having ſuſtained various Loſſes, becomes inſolvent; yet (being willing to give his Creditors all poſſible Sasisfaction,) gives to be divided among them, Wares to the Value of 372 *l.* 6 *s.* and Debts due to him, amounting to *l.* 497 : 4 : 4 *d.* I demand how much of that Dividend each Creditor is to receive, proportionable to the reſpective Sum due to him?

Work as in *Example* 8, and you'll find each Pound muſt have 11*s.* 6*d.* The Sum due is 1512 *l.* 4 *s.* which, with the Dividend, being multiplied by 5, becauſe 4 *s.* is $\frac{1}{5}$ of a *l.* there ariſes *l.* 4347 : 11 : 8 *d.* to be divided by 7561, as directed in the laſt *Example.* Which done, multiply the Sum due to each Creditor, by 11 $\frac{1}{2}$ *s.* then having divided the Products by 20 (or, if you work by Practice) you'll find for *A*, *l.* 205 : 4 : 0 $\frac{3}{4}$ *d.* *B*, *l.* 160 : 13 : 3 $\frac{1}{2}$ *d.* *C*, *l.* 142 : 4 : 8 $\frac{3}{5}$ *d.* *D*, *l.* 110 : 17 : 4 $\frac{7}{10}$ *E*, *l.* 94 : 13 : 4 $\frac{11}{20}$ *d.* *F*, *l.* 84 : 6 : 9 $\frac{3}{20}$ *d.* and for *G*, *l.* 71 : 10 : 8 $\frac{7}{20}$ *d.* The Sum of all being *l.* 869 : 10 : 3 $\frac{3}{5}$ *d.* which is $\frac{2}{5}$ *d.* too little.

*Ex.*10. A Man owing to *A*, 425 *l.* 2 *s.* to *B*, 339 *l.* 6 *s.* to *C*, 200 *l.* to *D*, 550 *l.* and to *E*, 39 *l.* 2 *s.* has but 1046 *l.* 13 *s.* to ſatisfy theſe his Creditors withal: What muſt each of them receive thereof?

If you work as in the two laſt Examples, you will find that 13 *s.* 5 $\frac{1}{2}$ *d.* will be too little, but 13 *s.* 5 $\frac{3}{4}$ *d.* will be too much for each *l.* Therefore a more exact and eaſier

Way will be, to find what Part of a Pound in Decimals each Pound muſt have, which is .6737 *l.* Then multiplying the Debt due to each Man thereby, the Anſwer will be, for *A*, 286.38987*l.* for *B*, 228.58641*l.* for *C*, 134.74*l.* for *D*, 370.535 *l.* and for *E*, 26.34167 *l.*

Otherwiſe, If you work to ſee what 100 *l.* muſt have, you ſhall find the Operation to produce 67 *l.* 7 *s.* 6 *d.* very near; then ſay, If 100 *l.* give *l.* 67 : 7 : 6 *d.* what the Sum due to each Man? And thus the Anſwer may be as follows, *viz.*

		l.	*s.*	
There is to be given, unto	*A*,	286	8	
	B,	228	12	
	C,	134	15	
	D,	370	11	3
	E,	26	6	9
		1046	13	0

Thus I have ſhewn ſeveral Ways to work Queſtions belonging to this Rule. The Ingenious may make choice of what is fitteſt for his Purpoſe.

Ex. 11. Suppoſe a Man has Goods worth 423 *l.* 11 *s.* 4 *d.* and Debts due to him amounting to 321 *l.* 6 *s.* 4 *d.* and owes as followeth, *viz.* to *A*, 100 *l.* to *B*, 100 *l.* 10 *s.* to *C*, 300 *l.* to *D*, 140 *l.* 5 *s.* and to *E*, 641 *l.* 5 *s.* What muſt each Creditor have? The Operation is left for the Learner's Practice.

Ex. 12. *A* and *B* made a common Stock; *A* put in 40 *l.* for 3 Months, *B* ſtocked in 75 *l.* for 4 Months; thereby they gain'd 70 *l.* What Share of it muſt each have, proportionable to his Stock and Time? *Anſw.* *A* muſt have 20 *l.* and *B* 50 *l.*

```
 l.
 40      75            6—1—120
  3       4            6——
——      ——                  20
A, 120  B, 300
 300                   6—1—300
——                     6——
 420—70                     50
7————
 6—1
```

Ex. 13. Four Merchants made a Joint-Stock; *A* put in 669 *l.* for 10 Months, *B*, 810 *l.* for 8 Months, *C*, 900 *l.*

C, 900 *l.* for 7 Months, and *D*, 1040 *l.* for 12 Months; and then their Stock was increaſed to 35145 *l.* What muſt each have thereof? *Anſ.* *A*, 7359 *l.* *B*, 7128 *l.* *C*, 6930 *l.* and *D*, 13728 *l.*

Ex. 14. Three Merchants made a Joint-Stock, as follows, *viz.* *A* put in 109 *l.* 5 *s.* for 3 Months; *B*, 450 *l.* 7 *s.* for 4 Months, and *C* 147 *l.* 12 *s.* for 6 Months; they having gain'd *l.* 209 : 7 : 2 *d.* What is each Man's Share thereof?

		l.	*s.*	*d.*
Anſwer,	*A*'s,	22	15	$2\frac{31240}{60295}$
	B's,	125	1	$11\frac{26103}{60295}$
	C's,	61	10	$0\frac{2952}{60295}$
				1
Proof		209	7	2

BArter, or *Truck*, is the exchanging of one Commodity for another.

Examples.

1. *A* has 144 Ells of Linen Cloth worth 15 *d.* *per* Ell, which he wou'd

barter with *B* for Cheeſe, at 18 *s.* 9 *d. per* 100 *lb.* How many *lb.* of it ſhou'd *B* give him for the Linen? *Anſw.* 960 *l.*

144
Add $\frac{1}{4}$ 36
180 *s.* the Linen amounts to.

s. *lb.* *s.*
Now ſay, $18\frac{3}{4}$—100———180
———— 4 ——16
75—400 2880
5——— — 3———
15— 80 *fac.* 960 *lb.*
5——— —
3— 16

Ex. 2. *A* has 13 *C.* 3 *qrs.* 14 *lb.* of Pepper, at 2 *l.* 16 *s. per C.* weight, and *B* has Cotton, at 9 *d. per lb.* how much Cotton muſt *B* give *A* for his Pepper? *Anſw.* 9 $\frac{1}{4}$ *C.* weight.

Ex. 3. *A* has Broad-Cloths, at 10*l.* 10*s.* the Piece; and *B* has Mace, at 12 *s. per lb.* How many *lb.* of Mace muſt *B* give *A* for 24 of theſe Cloths? *Anſw.* 420 *l.*

Ex. 4. *A* ſold to *B* 18 Pieces of Linen, of 50 Ells each, at 16 Stivers the Ell; *B* gives him, in Part of Payment, 5 Cloths, at 20 *l.* *Flem.* *per* Piece: What remains due? *Anſ.* 120 Guilders.

18	20	from 720
——50	5	ſubt. 600
900	——	——
Subt. $\frac{1}{5}$ 180	100	Rem. 120 *gl.*
——	——6	
720 *gl.*	600 *gl.*	

Ex. 5. *A* had 14 *C.* wt. of Sugar, at 6 *d.* *per l.* for which *B* gave him 1 C. 3 *qrs.* of Cinnamon, what was it rated at *per lb.* *Anſw.* at 4 *s.*

*Ex.*6. *A* delivered to *B* 320 Dozen of Candles, at 4 *s.* 6 *d.* the dozen; in Payment whereof *B* gave him 30 *l.* in Money, and the reſt in Cotton, at 8 *d.* *per lb.* How much Cotton was given? *Anſw.* 11 $\frac{1}{4}$ C. weight.

The Candles amount to 72 *l.* thence deduct 30 *l.* and reduce the Remainder to Pence, which divide by 8.

*Ex.*7. *A* bought from *B* 608 Yards of Broad-Cloth, at 14 *s.* the Yard: In Payment whereof, he gave him in Money, 125 *l.* 12 *s.* and 85 *C.*, 2 *qrs.* 24 *lb.* of Bees-wax: The Queſtion is, to know what the *C.* weight of the ſaid Wax was rated at? *Anſw.* at 3 *l.* 10 *s.*

The Operation is briefly thus.

```
  C. qrs. lb.
  85 : 2 : 24    608 × 14
     4           2432
 ────────       ─────────
   342           851|2
     7      2|0- ─────
 ────────        425 : 12
  2394           125 : 12     112
 ─────── 4      ─────────  4 ─────
  96|00 ........ 3|00 : 0      28
3 ─────────────────────     8 ─────
  32 ........... 1        Facit 3½ l.
```

Of Loſs and Gain.

Example 1. BOught 872 Yards of Broad-Cloth, at 8 *s.* 6 *d.* the Yard: Sold the ſame again, at 10 *s.* 4 *d.* *per* Yard: What is gain'd thereby? *Anſ.* 79 *l.* 18 *s.* 8 *d.*

6

$10\frac{1}{3}$ | 2

$8\frac{1}{2}$ | 3

$1\frac{5}{6}$ *s.* gain'd *per* Yd.

872

2

1744

Subtr. $\frac{1}{6}$ $145\frac{1}{3}$

$159|8\frac{2}{3}$

2|0

Facit l. 79:18:8 *d.*

*Ex.*2. Bought 6 *C.* 3 *qrs.* of Cloves, at 2 *s.* 4 *d. per lb.*; and ſold the ſame again for 105 *l.* 8 *s.* What's gain'd by the Bargain? *Anſ.* 17 *l.* 4 *s.*

Ex. 3. Bought 248 Yards of Holland, for 62 *l.* How muſt it be ſold *per* Yd. to gain 20 *l.* 13 *s.* 4 *d.* by the whole Parcel? *Anſw.* at 6 *s.* 8 *d.*

Add the two Sums together, then ſay, If 248 Yards give *l.* 82:13:4 *d.* What will one Yard give?

Ex. 4. Wares being bought at 4 *s.* the *lb.* are ſold again at 3 *s.* 4 *d. per lb.* What is loſt *per cent.* at that rate? *Anſw.* $16\frac{2}{3}$ *per cent.*

From 4

Subtr. $3\frac{1}{3}$

4 — $\frac{2}{3}$ — 100

Fac. $16\frac{2}{3}$

Of Intereſt.

PRincipal is the Sum from which the Intereſt is reckoned.

Intereſt is the Sum reckon'd for the Loan, or Forbearance of the Principal.

Intereſt is either Simple or Compound.

Simple Intereſt is that which is counted for the Principal only.

Compound Intereſt, or Intereſt upon Intereſt, is that which is reckon'd for the Principal and Intereſt due thereupon jointly.

There are ſeveral Ways for the Calculation of Intereſt.

Examples.

1. What is the Intereſt of *l.* 348 : 13 : 2 *d.* for a Year, at 6 *per cent. per Annum*? *Anſwer, l.* 20 : 18 : 4$\frac{1}{2}$ *d.*

l. s. d.
348 : 13 : 2
6
20|91 : 19 : 0
20
18|39
12
4|68

Ex. 2. What will the Intereſt of *l.* 551 : 2 : 6 *d.* amount to, for a Year, at 6 *per cent.*? *Anſ. l.* 33:1:4 *d.*

Ex. 3. How much is a Year's Intereſt of *l.* 826 : 13 : 9 *d.* at 5 *per cent. per Ann.*? *Anſ. l.* 41 : 6 : 8¼ *d.*

Ex. 4. What comes the Intereſt of *l.* 551 : 2 : 6 *d.* to for 14 Months, at 5 *per cent. per Annum*? *Anſwer, l.* 32 : 2 : 11¾ *d.*

l. s. d.
551 : 2 : 6
5
27|55 : 12 : 6
20
11|12
12
1|50

		l.	*s.*	*d.*
1 Year's Int. is		27:	11:	1½
2 Mon. is	⅙	4:	11:	10¼
Fac. l.		32:	2:	11¾

Ex. 5. What does the Intereſt of *l.* 275 : 11 : 3 *d.* amount to for 3 Years, 5 Months, and 20 Days, *viz.* ſimple Intereſt at 5 *per cent. per Annum?* *Anſw.* *l.* 47 : 16 : 9 $\frac{1}{2}$ *d.* and ſomething more; as is evident by the following Operations.

l. 275 : 11 : 3		*l.*	*s.*	*d.*
5		13	15	6$\frac{3}{4}$
13 | 77 : 16 : 3				3
20	3 Y. Int. is	41	6	8$\frac{1}{4}$
	4 M. $\frac{1}{3}$ of a Y.	4	11	10$\frac{1}{4}$
15 | 56	1 M. $\frac{1}{4}$ of 4	1	2	11$\frac{1}{2}$ +
12	10 d. $\frac{1}{3}$ of a m.	0	7	7$\frac{3}{4}$ +
6 | 75	10 d. . . .	0	7	7$\frac{3}{4}$ +
	Fac. l.	47	16	9$\frac{1}{2}$ +

Or thus,

	l.	*s.*	*d.*	*q.*	
	13	15	6	3	
					3$\frac{1}{2}$
	41	6	8	1	
	6	17	9	1 +	
	48	4	5	2	
Subtr. $\frac{1}{18}$ of $\frac{1}{2}$	0	7	7	3	
Facit l.	47	16	9	3	

Ex. 6. What is the Intereſt of 275 *l.* 11 *s.* 3 *d.* for 70 Days, at the Rate of 6 *per cent. per Annum*? *Anſw.* 3 *l.* 3 *s.* 5 *d.* You may ſay, If 100 *l.* in 365 Days give 6 *l.* what 275 *l.* 11 *s.* 3 *d.* in 70 Days. This way is very exact.

The Way of reckoning 12 Mon. for a Year, at 30 Days *per* Month, ſuppoſes but 360 Days in the Year; whereas there are 365 in a common, and 366 Days in the leap Year.

Ex. 7. What comes the Intereſt of 400 *l.* to, for 3 Weeks, at the Rate of 6 *per cent.* for a Year? *Anſw.* 1 *l.* 7 *s.* 7$\frac{1}{4}$ *d.*

Ex. 8. What's the Intereſt of 468 *l.* 16 *s.* 8 *d.* for one Month, at 6 *per cent. per Annum*? *Anſw.* 2 *l.* 6 *s.* 10$\frac{1}{2}$ *d.*

```
       l.     s.    d.
      468  :  16  :  8
   2 ————————  ——————————
    2|34   :   8  :  4
     |——20
    6|88
     |——12
   10|60
```

Ex. 9. What does the ſimple Intereſt of 2349 *l.* 8 *s.* 9 *d.* amount to, for 7 Years, 7 Mon. and 5 Days, at 6 *per cent. per Annum*? *Anſw.* 1070 *l.* 18 *s.* 10$\frac{3}{4}$ *d.*

```
   l.      s.    d.
  2349  :  8  :  9
  ----------------- 6
  140|96 : 12 :  6
      —20
   19|32
      —12
    3|90
      —4
    3|60
```

	l.	s.	d.	q.
	140	19	3	3
				7
M.	986	15	2	1
6, is $\frac{1}{2}$	70	9	7	2
1, $\frac{1}{6}$ of $\frac{1}{2}$	11	14	11	1
5 d. $\frac{1}{6}$ of 1 m.	1	19	1	3
Facit l.	1070	18	10	3

To calculate compound Intereſt, make 100 the firſt Term; 100 and the Rate of Intereſt, the ſecond; and the Principal the third Term; and the Operation will give the Amount of Principal and Intereſt for one Year. Repeat the Operation according to the Number of Years that the Money is forborn, always making the Amount laſt found, the third Term for the ſucceeding Year. The beſt Way is to work by Decimals.

Examples.

Ex. 1. What is the Amount of 550 *l.* 10 *s.* forborn 3 Years, at 6 *per cent. per Annum*, compound Intereſt? *Anſw.* 655 *l.* 13 *s.* 1 *d.*

The Operation, two Ways.

l. *l.* *l.*
100 —— 106 —— 550.5
33.030

The 1ſt. Year's Amount, *l.* 583.53

l. *l.* *l.*
100 —— 106 —— 583.53
35.0118

The 2d. Year's Amount, 618.5418

l. *l.* *l.*
100 —— 106 —— 618.5418
37.112508

The total Amount, 655.654308

Or thus,

l.
550.5×106
33.03
583.53
35.0118
618.5418
37.1125
655.6543 *l. Fac.*

In this ſecond Operation, I multiply only by 6, and ſet the Product out two Places towards the right Hand, then add; and again multiply as before. Thus at once the given Number is multiplied by 106, and divided by 100. When there are more than 4 or 5 Places of Decimals, they may be rejected; but Regard is to be had to the Increaſe ariſing, or that wou'd ariſe, in Multiplication.

You may alſo find the firſt Year's Intereſt by vulgar Arithmetick, then add it to the Principal, and again find the Intereſt of that Sum, *&c.*

Ex. 2. At 6 *per cent. per Ann.* what will 275 *l.* 11 *s.* 3 *d.* amount to, at the end of 5 Years, reckoning comp. Int.? *An.* 368.7647*l* or *l.*368:15:3½*d.*

Ex. 3. What will 500 *l.* amount to, in 4 Years, at 10 *per cent. per An.* comp. Intereſt? *Anſ.* 732 *l.* 1 *s.*

Ex. 4. What will 1000 *l.* amount to in 3 Years, at 6 *per cent. per Ann.* comp. Intereſt? *An. l.* 1191 : 0 : 4 *d.*

Ex. 5. At 5 *l.* 10 *s. per cent. per Ann.* what will 560 *l.* 10 *s.* 9 *d.* amount to, being forborn 5 years and an half? *Anſw.* to 752.7463 *l.* or 752 *l.* 14 *s.* 11 *d.*

l. *The Operation may be as follows.*

560.5375×105.5
28.0269
2.8026

591.3670, the 1ſt Year's Amount.
29.5683
2.9568

623.8921, the 2d Year's Amount.
31.1946
3.1194

658.2061, the 3d Year's Amount.
32.9103
3.2910

694.4074, the 4th Year's Amount.
34.7204
3.4720

732.5998×102.75 5th Year's Am.
14.6520
5.1282
3663

752.7463 *l. Fac.* the total Amount.

Of Rebate, or Diſcount.

REbate, or Diſcount, is the abating ſo much Money on a Debt paid before it's due, as might be gain'd by the Sum receiv'd, if it were put out to Intereſt at the ſame Rate, and for the ſame Time.

Rule 1. As 12 Months is to the Rate of Diſcount *per Annum*; ſo is the Time propoſed, to a fourth Number.

Then ſay, If 100 and that fourth Number (added together) abate that *Facit*; what will the given Sum rebate? Or elſe,

2. Multiply 12 Months by 100, then divide the Product by the Rate of Intereſt, or Diſcount, and to the Quotient add the Time propoſed; which Sum reſerve for a Diviſor. Then multiply the Sum given by the propoſed Time, and divide the Product by the ſaid Diviſor.

Examp. 1. What's the Rebate of 420 *l.* due in 12 Months, at 6 *per* *cent. per Annum*; and how much ready Money will now diſcharge the ſaid Debt? *Anſw.* the Diſcount is 23 *l.* 15 *s.* 5 ½ *d.* and 396 *l.* 4 *s.* 6½ *d.* is to be paid.

```
      l.          l.          l.
     106 ———— 6 ———— 420
                                  6
      · ,     . . . . )2520
 l.23 : 15 : 5½ d.    400
  420 :  0 : 0          82
 l.396 :  4 : 6½              20
                      1640
                       580

                        50
                            12
                       600

                        70
                         4
                       280
                        68
```

Note, In this and ſuch like Examples, wherein the Time is juſt 12 Months, the Solution is by a ſingle Rule of Three. And if you deſire only to know what Money muſt be paid, make 100 the ſecond Term.

Ex. 2 What preſent Money will diſcharge a Debt of 122 *l.* 11 *s.* 4 *d.* due at 3 Months, diſcounting at the Rate of 6 *per cent. per Annum*? *Anſw.* 120 *l.* 15 *s.* 1½ *d.*

By *Rule* 2d the Operation for the Diſcount is thus,

```
             12)00
            6
              200        l.  s. d.
                         122:11:4
                3        --------- 3
             ----
              203 . . )367:14:0
     -----------------  367
     l. 1 : 16 : 2½     ----
                        1648
                         120
     l.    s.   d.      ----
Sum,  122 : 11 : 4      3294
Diſc.   1 : 16 : 2½     1264
     --------------     ----
To pay, 120 : 15 : 1½     46
                          12
                         ---
                         552
                         ---
                         146
                           4
                         ---
                         584
                         ---
                         178
```

Ex. 3. What does the Rebate of 155 *l.* 19 *s.* 6¾ *d.* amount to, for 11

Months, at the Rate of 6 *per cent. per Annum?* *Anſw.* 8 *l.* 1 *s.* 7$\frac{1}{2}$ *d.*

Ex. 4. *A* bought Wares of *B*, amounting to 795 *l.* 11 *s.* 2 *d.* payable at the End of 11 Months; *B*, ſtanding in need of Money, is willing to allow Diſcount, at the Rate of 6 *per cent. per Annum*, if preſent Payment be made, for theſe Wares; and thus they agreed. How much Money will ſatisfy the Selling-Man? *Anſw.* 754 *l.* 1 *s.* 8$\frac{1}{4}$ *d.*

Ex. 5. What is the Diſcount of 1250 *l.* for 15 Months at the Rate of 8 *per cent. per Annum?* *Anſwer*, 113 *l.* 12 *s.* 8$\frac{1}{2}$ *d.*

M. *l.* *M.*
12 —— 8 —— 15
l. Add $\frac{1}{4}$ 2 *l.*
11|0 —— 1|0 —— 1250
11 —— ——
Facit l. 113:12:8$\frac{1}{2}$ *d.*

Ex. 6. What comes the Rebate of 3600 *l.* to, for 3 Months, at 10 *per cent. per Ann.?* *Anſw.* 87 *l.* 16 *s.* 1 *d.*

120|0

```
  120|0     3600
    3|         3
  -----   ------
  123 . . .)10800   l.    s.   d.
3-----------------
   41 . . . .)3600(87 : 16 : 1 facit.
              320
              ---
               33
               20
              ---
              660
              250
              ---
                4
               12
              ---
               48
              ---
                7
```

Ex. 7. *A* ſold Wares to *B*, amounting to 1591 *l.* 2 *s.* 4 *d.* payable $\frac{1}{2}$ at 3 Months, and the reſt at 6 Months Time; but it was agreed between them to diſcount at the Rate of *6 per cent. per Ann.* and the Debt to be diſcharged with preſent Payment. What is the Diſcount, and how much is to be paid? *Anſ:* the Diſcount is 34 *l.* 18 *s.* 6$\frac{1}{2}$ *d.* and 1556 *l.* 3 *s.* 9$\frac{1}{2}$ *d.* is to be paid.

Divide the Sum into two equal Parts, then work by the Rule, and you ſhall find the Diſcount of

l. s. d.			*l. s. d.*
795:11:2	for 3 M.	to be	11:15:1½
795:11:2	for 6 M.		23: 3:5
1591: 2:4			34:18:6½
34:18:6½			
1556: 3:9½			

Ex.8. Suppoſe one to have bought 369 *lb*. of Cocheneal, at 52 *s*. *per lb*. what is to be paid for the ſame, diſcounting for 6 Months, at the Rate of 8 *per cent*. *per Ann*.? *Anſ*. 922 *l*. 8 *s*.

	l.	*s.*
The Cochen. amounts to	959 :	8
The Rebate is	36 :	18
And there remains . . .	922 :	10

Ex. 9. What is the Rebate of 2650 *l*. for 18 Months, at the Rate of 8 *per cent*. *per Ann*.? *Anſwer*, 283 *l*. 18 *s*. 6¼ *d*.

Ex. 10. What will the Diſcount of 3670 *l*. amount to for 2 Years, at 8 *per cent*. *per Ann*. *Anſw*. 506 *l*. 4 *s*. 1½ *d*.

Ex. 11. What preſent Money will diſcharge 1258 *l*. due at the end of 3 Weeks, Rebate being made at the

Rate of 6½ *per cent. per Annum?* *Anſwer*, 1253 *l.* 6 *s.*

W. *l.* *s.* *W.*
52 —— 6 : 10 —— 3
3
19 : 10
20
52)390(7 : 6 20 —)7½
26 —— 2
12 40 — 15
312 5
0 8 — ⅜

l. *l.* *l.*
100⅜ —— 100 —— 1258
8 8
803)1006400(
Facit 1253 *l.* 6 *s.*
2034
4280
2650
241
20
4820
2

Ex. 12. What preſent Money is worth a Debt of 150 *l.* 10 *s.* due at the end of 73 Days, diſcounting at 6 *per cent. per Annum?* *Anſ.* 148 *l.* 14 *s.* 3½ *d.*

365

D. *l.* *D.*
365 —— 6 —— 73
6
. . . . . .)438
1 *l.* 4
20
1460
0

l. *l.* *l.*
101.2 —— 100 —— 150.5
100
. . . .)15050.0
Fac. l. 148:14:3½ *d.*
4930
8820
724
20
14480
4360
312
12
3744
708
4
2832
808

Of

Of Agio, and Bank-money.

AGio is the Advance on Bank-money, reckon'd at ſo much *per cent.* There will be no Difficulty, concerning this, to ſuch as underſtand the preceeding Rules. The following Examples will make all, relating thereto, plain.

Ex. 1. What is the Agio of 1260*gl.* Bankmoney, at 3½ *per cent.*? *Anſ.* *Gl.* 44 : 2 :

```
gl.       gl.      gl.
100 ———— 3½ ———— 1260
                 ———— 3½
                 3780
                  630
                 ————
                 44|10 ————
                   |—— 20
                   2|00
```

Ex. 2. What's the Agio of 1177*gl.* Bank-money, at 3⅞ *per cent.*? *Anſw.* *Gl.* 45 : 12 : 2

Gl. 1999

gl. *gl.* *gl.*
100 —— $3\frac{7}{8}$ —— 1177
4 — $\frac{1}{8}$
4708
ſubtr. $\frac{1}{8}$ 147 : 2 : 8
45|60 : 17 : 8
20
12|17
16
2|80

Ex. 3. How much current Money is to be paid for a Bill of Exchange, amounting, in Banco, to *Gl.* 1999 : 8 : 8, the Agio being at 4 *per cent.*? *Anſw.* *Gl.* 2078 : 8 :—

Gl. 1999: 8:8
4
79|97:14:0
20
19|54
16
8|64

Gl. 1999: 8:8
Add 79:19:8
*Facit Gl.*2079: 8:0

Ex. 4. What muſt be paid *per* Caſh, for 1550 *gl.* 10 *ſt.* Bank-money,

ney, Agio at $3\frac{1}{4}$ *per cent.?* *Anſwer,* *Gl.* 1600 : 17 : 12

Ex. 5. How much Current Money is to be receiv'd for a Bill amounting, in Bank-money, to 5338 *Gl.* Agio at $3\frac{1}{8}$ *per cent.?* *Anſ.* 5531 *gl.* 10 *ſt.*

Ex. 6. What muſt be written off in Banco, for *Gl.* 1310 : 8 : current Money, when the Agio is at 4 *per cent.?* *Anſw.* 1260 *gl.*

```
Cur.mon.   B.mon.        Cur.mon.
104———————100———————1310 : 8
                   ——————————100
                 104)131040
         ——————————
   Fac. 1260 gl.     270
                      624
                     ————
                      00
```

Ex. 7. How much Bank-money may be bought for *Gl.* 5396 : 3 : 12 current Coin, Agio at $4\frac{3}{8}$ *per cent.?* *Anſw.* 5170 *gl.*

```
104 3/8—100—5396 3/16   |  20 ) 3 3/4
————8       ———————8    |  ——————————4
 835  . . . )43169.50   |  80—15
———————————             | 5——————————
fa.5170 gl.   1419      |  16— 3/16
              5845
             —————
               000
```

Ex. 8. When the Agio of 9795 *gl.* Bank-money, is 391 *gl.* 16 *ſt.* at what Rate is that *per cent.*? *Anſw.* At the Rare of 4 *per cent.*

gl. gl. gl.
9795 —— 391.8 —— 100
—— 100
)39180
Facit 4 *gl.* 0

Ex. 9. If the Agio of 1260 *gl.* amount to 44 *gl.* 2 *ſt.* at what Rate *per cent.* is it reckon'd? *Anſw.* At 3½ *per cent.*

gl. gl. gl.
126|0 —— 44.1 —— 100
—— 100
)441|0
Facit 3 *gl.* 10 *ſt.* 63
20
1260
00

Of Exchange.

EXchange is the receiving Money in one Country for the Value paid in another.

The Courſe of Exchange being known, and the Way of reducing the Coin any Nation trades in, to that it exchanges in, (*& contra*) being underſtood; the Value of a Bill of Exchange, or of a Sum of Money to be Exchanged, is found the ſame Way as in caſting up the Amount of any Parcel of Wares.

Ex. 1. Bought Wares for a Merchant in *Bourdeaux*, amounting to 102 *l.* 4 *s.* Sterling; for which he orders to draw a Bill on him: How many *French* Crowns do theſe Wares amount to, Exchange at 56 *d. per* Crown? *Anſw.* 438 Crowns.

s. *Cr.* *l.* *s.*

$4\frac{2}{3}$ —— 1 —— 102 : 4
—3 20
14
2044
—— 3
6132
2 ——
3066
7 ——
Facit 438 *Cr.*

Ex. 2. How much Sterling Money muſt be paid in *London* for a Bill of 438 *Fr.* Crowns, Exchange at 56 *d. per* Crown? *Anſ.* 102 *l.* 4 *s.*

Cr. *s.* *Cr.*
1 — $4\frac{2}{3}$ — 438
—— 3 ——
3 — 14 146×14
584
——
204|4
2|0 ——
Facit l. 102 : 4 *s.*

Or thus,
438
s. ——
4, $\frac{1}{3}$ 87:12
8 *d.* $\frac{1}{6}$ of $\frac{1}{3}$ 14:12
——
l. 102: 4*s.*

Ex. 3. How many *French* Crowns will a Bill of 585 *l.* 11 *s.* $9\frac{3}{4}$ *d.* Sterling amount to, at $55\frac{3}{8}$ *d. per* Crown? *Anſw.* 2538 *Cr.*

d. *Cr.* *l.* *s.* *d.*

$55\frac{3}{8}$ —— 1 —— 585 : 11 : $9\frac{3}{4}$

—— 8 20

443 11711

12

$140541\frac{3}{4}$

8

443)1124334(2538

2383

1683

3544

00

Ex. 4. What Sterling Money muſt be paid for a Bill of 8297 *Cr.* 13 *ſolz,* 8 *den.* Exchange at $54\frac{1}{4}$ *d. per* Crown? *Anſwer,* 1875 *l.* 10 *s.* $4\frac{1}{2}$ *d.*

Cr. — *d.* — *Cr.* *ſolz.* *den.*

1 — $54\frac{1}{4}$ — 8297 : 13 : 8

60 — 60

12 — 497833

720 — 12

5974004

$54\frac{1}{4}$

23896016

29870020

1493501 (12)

72|0)3240897|17(450124

360

089

177

331

43

12)450124

d.

37511|0 — 4

2|0)

s. *d.*

1875 : 10 : $4\frac{437}{720}$

Or thus,

Cr. *ſolz* *d.*
8297 : 13$\frac{2}{3}$ at 54$\frac{1}{4}$
60 —2
497833 108$\frac{1}{2}$
54$\frac{1}{4}$ 3—
1991332 36
2489165
124458
36
2700747|6
6|0)
450124$\frac{36}{60}$
12)
3751|0—4
2|0)
Fac. l. 1875 : 10 : 4$\frac{1}{2}$ *d.*

5. What *French* Money will pay a Bill of 1529 *l.* 10 *s.* Sterling, Exchange at 53 *d. per* Crown? *Anſw.* 6926 *Cr.* 2 *ſolz,* 3 *den.*

d. *Cr.* *l.* *s.*
53——1——1529 : 10
20
30590
12 *Cr.* *ſolz* *den.*
53)367080(6926 : 2 : 3 *fac.*
490
138
320
2
60
53)120(2 Solz
14
12
53)168(3 den.
9

Ex. 6. At $53\frac{1}{4}$ *d. per* Crown, what muſt be paid for 2294 *l.* 5 *s.*? *Anſ.* 10340 *Cr.* 16 *ſolz*, 10 *den.*

Ex. 7. How much *Holland*'s Money does a Bill of 1126 *l.* 10 *s.* Sterling amount to; Exchange at 34 *s.* 8 *d. per l.* Sterling? *Anſwer*, *Gl.* 11715 : 12 : —

l. *s.* *d.* *l.*
1 —— 34 : 8 —— $1126\frac{1}{2}$ × 416
12 4504
6756
—— 208
416 ————
46862|4
4|0) ————
Facit Gl. 11715 : 12 : —

Or thus, *s.* *d.*
34 : 8
12
——
41|6
4|0 ——

l. *s.*
1126 : 10 at . . . . $10\frac{2}{5}$ *gl.*
225 : 6
225 : 6
————
Gl. 11715 : 12

Ex. 8. What muſt be paid in *Edenburgh* for 1000 *gl.* Exchange at 22 *d. per* Guilder? *Anſwer*, 1100 *l. Scots*, or 91 *l.* 13 *s.* 4 *d.* Sterling.

gl. *d.* *gl.*
1 —— 22 —— 1000
Add $\frac{1}{10}$ 100
————
1100
12) ————
Facit l. 91 : 13 : 4 *d.*

Ex. 9. What Sterling Money muſt be drawn for Wares, bought in *Rotterdam*, amounting to 11715 *gl.* 12 *ſt.* Exchange at 34 *s.* 8 *d. per l.* Sterling? *Anſw.* 1126 *l.* 10 *s.*

```
 s.   d.     l.       gl.    ſt.
 34 : 8 ——— 1 ——— 11715 : 12
  6                       20
———                  ——————————
208 . . . . . . . )234312(1126 l.
—————————————————    263
   1126 l. 10         551
                      1352
                    ————————
                      104
                       20
                208)2080(10 s.
                    ————
                     00
```

Ex. 10 What's the Amount of 288 *l.* Sterling in Banco, at 36 *s.* 6 *d. per l.* and how much current Money muſt be paid for the ſame, Agio at 4 *per cent.*? *Anſwer*, It amounts to *Gl.* 3153 : 12 :— Bank-money, and in current Coin, *Gl.* 3279 : 14 : 12.

Ex. 11. A Merchant in *London* owes to his Factor in *Rotterdam* 5369 *gl.* 3½ *ſt. per* Ballance of Ac compts: How much Sterling Money muſt be drawn for the ſame, Exchange at 36 *s.* 9 *d.* *per l.*? *Anſ.* 487 *l.*

```
 s.    d.     l.      gl.     ſt.
 36 : 9 —— 1 —— 5369 : (3½) 7
 12                    40
 ————               ——————————
 441 . . . . )214767
 ————————————————  3836
     487 l.          3087
                    ——————
                        0
```

Ex. 12. What Sterling Money does a Bill of *l.* 109 : 7 : 6 *d. Flem.* amount to, Exchange at 35 *s. per l.* Sterling? *Anſw.* 62 *l.* 10 *s.*

```
  l. 109 : 7 s. : 6 d.
        20
      ————————
      2187½
   5)————————
       437½
   7)————————
```

Fac. 62½ *l.* Sterling.

Ex. 13. A Merchant at *Edenburgh*, being indebted to his Correſpondent in *Paris*, 3000 *French* Crowns, orders him to draw the Value upon his Factor at *Middleburgh*; now if the Exchange be at 98 *d. Flemiſh per* Crown, and at 22 *d. per* Guilder, I demand what Sterling Money theſe 3000 Crowns do amount to? *Anſw.* 673 *l.* 15 *s.*

98
3000
―――
29400|0
4|0) ―――
7350 *gl.*

7350
――― 2 — $\frac{1}{6}$
14700
ſubtr. $\frac{1}{6}$ 1225
―――
1347|5
2|0) ―――
Facit l. 673 : 15

Ex. 14. What muſt be paid for a Bill of 400 *French* Crowns, at 96$\frac{1}{2}$*d. Flemiſh per* Crown, payable in Banco, Agio at 4$\frac{1}{8}$ *per cent.*? *Anſwer*, G*l.* 1004 : 16 : —

Ex. 15. How much *Holland*'s current Coin muſt be paid for a Bill of 570$\frac{1}{5}$ *French* Crowns, Exchange at 99$\frac{5}{8}$ *d.* Bank-money, and the Agio at 4 *per cent.*? *Anſw.* 1476 *gl.* 19 *ſt.*

570$\frac{1}{5}$

```
      570 1/5                          570 1/5
      ————————100——3/8                ————————3
      57020                           1710 3/5
ſubt. 3/8  214                     8) ————————
      ————————                         213 3/4 3/0
      5680|6   Gl.1420: 3
 4|0) ————————      ————————4
  Gl. 1420: 3    56|80:12
  add    56:16     |  20
      ————————       ————
ſa. Gl. 1476:19     16|12
```

Ex. 16. What's to be paid in *Rotterdam* for a Bill of 152 *l.* 16 *s.* 4 *d.* Sterling, at 34 *s.* 8 *d. Flem. per l.* the Agio being at 4 *per cent.*? *Anſwer*, *Gl.* 1652 : 17 : 4.

Ex. 17. What's the Amount, in *Holland*'s current Money, of two Bills payable in Banco, each of 100 *l.* Sterling, whereof the one is drawn at 34 *s.* 8 *d.* and the other, at 34 *s.* 9 *d.* the Agio reckon'd at 4 *per cent.*? *Anſw. Gl.* 2165 : 16 : —

Practical Queſtions.

NOW, that this little Book may be the more uſeful and delightful to Youth, eſpecially to ſuch who intend to learn Book-keeping, I ſhall add various Arithmetical Queſtions, with their Anſwers, not regarding an exact Order, nor reſtricting my ſelf to *Engliſh* Coin, Weight or Meaſure.

Queſtion 1. What do 500 Bars of Iron amount to, whoſe total Weight is 13500 *lb.* at 15 *s.* the 100 *lb.*? *Anſw.* 101 *l.* 5 *s.*

Qu. 2. What coſt 3 Casks of Indico, weiging Groſs 250, 240, and 210 *lb.*; Tare 14 *lb. per* Cask, at 3 *s. per lb.* Neat? *Anſw.* 98 *l.* 14 *s.*

Qu. 3. What is the Amount of 4 Bales of Madder, weighing Groſs, 1050, 1120, 1030, and 950 *lb.*; Tare, 4 *lb. per* 100, at 58 *s. per* 100*lb.* Neat? *Anſw.* 115 *l.* 10 *s.* 8½ *d.*

Qu. 4. What is to be paid for 750 Bolls of Salt, at 8 *s.* 6 *d.* *per* Boll? *Anſwer*, 318 *l.* 15 *s.*

Qu. 5. At 10 *s.* *per* Ell, what coſt 29¼ Ells? *Anſw.* 14 *l.* 12 *s.* 6 *d.*

```
       29 : 5
    2)————————
*Fac. l.* 14 : 12 : 6
```

Qu. 6. What comes the Commiſſion of 521 *l.* to, at 2 *per cent.*? *Anſw.* 10 *l.* 8 *s.* 4¼ *d.*

```
        521
      ———————2
  l. 10|42
       |———20
   s. 8|40
       |———12
   d. 4|80
       |———4
 far. 3|20
```

Qu. 7. What's the Amount of 400 Bars of Iron, weighing together 11400 *l.* at 13 *s.* 6 *d. per* 100 *l.*? *Anſwer*, 76 *l.* 19 *s.*

Qu. 8. At 5 *gl.* 16½ *ſt. per* Ell, what coſt 10¾ Ells? *An.* *Gl.*62:12:6.

*Qu.*9. At 7*gl.* 19½ *ſt.* the *lb.* what will 5½ *lb.* coſt? *An.* *Gl.*43 : 17 : 4.

Qu. 10. At the ſame Price, what's to be paid for 8¾ *lb.*? *Anſw.* *Gl.* 69 : 15 : 10.

Qu. 11. At 33¾ *gl. per* Laſt, what do 13½ Laſts amount to? *Anſwer*, *Gl.* 455 : 12 : 8.

Gl. 33 : 15 × 13½
101 : 5
16 : 17 : 8

Facit *Gl.* 455 : 12 : 8

Qu. 12. What's the Amount of $29\frac{1}{2}$ Tuns of Wine, at $17\frac{5}{6}$ *l. Flem. per* Tun? *Anſwer*, *Gl.* 3156 : 10 : —

$17\frac{5}{6}$
6

107
$29\frac{1}{2}$

963
214
53 : 10

Facit Gl. 3156 : 10

Qu. 13. At $18\frac{2}{3}$ *l. Flem.* the Tun, what do $7\frac{3}{4}$ Tuns of Wine amount to? *Anſw.* 868 Guilders.

Qu. 14. What do 16 Awms, $18\frac{3}{4}$ Virtels of *Rheniſh* Wine amount to, at $45\frac{1}{2}$ Rixdollars (of 50 *ſt.*) *per* Awm? *Anſw. Gl.* 1926 : 12 : 12.

Note, 20 Virtels make an Awm; *ergo*, (by *Rule* 7. on Reduction of Fractions) $18\frac{3}{4}$ Virt. is $\frac{15}{16}$ Awm.

Multiply the Rixdollars by 10, and divide the Product by 4, for Guilders; ſo the Operation may be briefly thus.

Rixd.
45.5
4)———
Gl. 113 : $15 \times 17 - \frac{1}{16}$.
796 : 5
———
1933 : 15
ſubtr. $\frac{1}{16}$ 7 : $2\frac{1}{16}$
———
Facit Gl. 1926 : 12 : 13

Qu. 15. What muſt be paid for 4350 *lb.* of Cheeſe, at $15\frac{3}{4}$ *gl. per* 100 *lb.* abating 1 *per cent.* for preſent Payment? *Anſwer*, *Gl.* 678 : 5 : 8.

The Operation may be thus,

Gl. 6,85 : 2 : 8 43 : 10

|20 ——— 16 — $\frac{1}{4}$

17|02 696 : 0

ſubtr. $\frac{1}{4}$ 10 : 17 : 8

Gl. 685 : 2 : 8

ſubtr. 1 *per cent.* 6 : 17 : 0

Facit Gl. 678 : 5 : 8

Qu. 16. Bought $36\frac{1}{3}$ Yards of Cloth, at 10 *s.* 6 *d.* the Yard; ſold thereof $17\frac{1}{2}$ Yards, at 12 *s.* 3 *d. per* Yard, and the reſt at $12\frac{5}{8}$ *s.* the Yd. What's gain'd thereby? *Anſwer,* 3 *l.* 10 *s.* $7\frac{3}{4}$ *d.*

Qu. 17. What's the Amount of 18 Pieces of Holland, containing 713 Ells *Flemiſh,* at 5 *s.* the *Engliſh* Ell? *Anſw.* 106 *l.* 19 *s.*

713

—— 6

427.8

4)——

Facit l. 106 : 19 *s.*

Qu. 18. A Merchant in *London*, having receiv'd from his Factor in *Rotterdam*, 10 Pieces of Taffety, containing 746 Ells *Flemiſh*, at 3 *gl.* the Ell; paid for Fraight, Cuſtom, and all Charges 11 *l.* 7 *s.* 10 *d.* Now if the Exchange be reckon'd at 35 *s.* *per l.* Sterling, what do theſe 10 Pieces amount to, in Sterling Money? *Anſw.* 224 *l.* 10 *s.* 8 *d.*

Qu. 19. What do 13 Pieces of Linen amount to, being of Contents and Price as follows, *viz.* 4 Pieces, cont. 59, 60, 58, & 60½ Ells, at 2 *s.* 2 *d.* *per* Ell: 3 Pieces, long, 60, 56, and 57 Ells, at 2 *s.* 6 *d.* the Ell: 4 Pieces, in length, 59, 60, 56, and 60 Ells, at 3 *s.* *per* Ell: and 2 Pieces of 60 and 61 Ells, at 3 *s.* 4 *d.* the Ell? *Anſw.* 102 *l.* 15 *s.* 5 *d.*

Qu. 20. Bought 10 Bales of Pepper, weighing together, Groſs, 4140 *lb.*; Tare *per* Bale, 4½ *lb.* at 18 *d.* *Flemiſh* the Pound: What muſt be paid for the ſaid 10 Bales, abating 1 *per cent.*? *Anſw.* *Gl.* 1824 : 6 : 8.

Qu. 21. What's to be paid for 581 Virtels of Brandy, at 14 *l. Flem.* for 30 Virtels, rebating 1 *per cent.*? *Anſw.* *Gl.* 1610 : 10 : 12.

Qu. 22. How much current Money is to be paid for 5 Bales of Pepper, whoſe Groſs Weight is 2067 *lb.* Tare, *per* Bale, $4\frac{1}{2}$ *lb.* at $17\frac{3}{4}$ *d. per l.* Bank-money, abating 1 *per cent.* for ready Money; the Agio being at 4 *per cent.*? *Anſw.* *Gl.* 934 : 2 : 8.

Qu. 23. What coſt 250 Bales of Ginger, weighing in all, Groſs, 22570 *lb.*; Tare 4 *lb. per* Bale, at 11 *gl.* 10 *ſt.* the 100 *lb.* Neat, with Abatement of 1 *per cent.*? *Anſwer*, 2455 *gl.* 15 *ſt.*

Qu. 24. What muſt be paid in current Coin for two Cask of Mace, poize Neat 621 *lb.* at $19\frac{2}{3}$ *s. per lb.* Bank-money, abating 1 *per cent.* and the Agio at $3\frac{7}{8}$ *per cent.*? *Anſw.* *Gl.* 3767 : 16 : 8.

Qu. 25. Bought of the *Eaſt-India* Company, 34 Bales of Pepper, weighing in all, Groſs, 14522 *lb.*; Tare, 4$\frac{1}{2}$ *lb. per* Bale, at 17 *d. Flem.* the *lb.* Bank-money, diſcounting 1 *per cent.* and adding to the Remainder, 1 *per* 1000 for the Poor; if the Agio be at 4 *per cent.* how much current Money is to be paid for them? *Anſw. Gl.* 6293 : 17 : 8.

Qu. 26. *A* ſold to *B*, 30 Laſt of Wheat, at 156 *g-gl. per* Laſt. *B* delivered to *A*, 15 Pieces of Brandy, containing 887$\frac{1}{2}$ Virtels, at the Rate of 15 *l. Flem.* for 30 Virtels, and 17 Bales of Pepper, poize Neat, 7184 *lb.* at 19 *d. per lb.* Bank-money, Agio reckon'd at 4 *per cent.* What remains due to *A*? *Anſwer, Gl.* 340 : 12 : —

Note, g-gl. ſignifies Gold Guilders, at 28 Stivers. Theſe may be reduc'd to Guilders, multiplying by 14, and dividing by 10.

Qu. 27. Sold 10 Laſt of Wheat, at 166 *g-gl.* the Laſt; Received, in Part of Payment, 10 Bales of Ginger, poize Neat, 4500 *lb.* at 15 *d. per lb.* and an Aſſignment of *Gl.*425 : 15 : — What remains due? *Anſw. Gl.* 210 : 15 : —

Qu. 28. A Merchant at *Nantes*, ſent to his Correſpondent in *Rotterdam* 80 Pieces of Brandy, amounting, with all Charges in *France*, to 8733 Livres. At their Arrival, was paid, for Fraight, Cuſtom, *&c. Gl.*584 : 15 : 8; how much *Holland*'s Money does the ſaid Brandy ſtand, Exchange at 93 *d. per French* Crown? *Anſw. Gl.*7352 : 17 : —

Qu. 29. A Merchant at *Bourdeaux* Ship'd 140 Tuns of Wine for *Rotterdam*, coſting, with all Charges till on Board, 14722 Livres, 6 Solz. Upon which there was inſured, 8000 *gl.* at 3 *per cent.* and at the Arrival thereof, was paid, for Fraight, Cuſtom, *&c. Gl.* 1320 : 14 : — I demand how much *Holland*'s Money theſe 140 Tuns of Wine do amount to, computing the Exchange at 92 *d. Flemiſh per French* Crown? *Anſw. Gl.* 12847 : 16 : —

Qu. 30. Bought 60 Pieces of *Harlem*'s Linen, each Piece being 80 Ells long, at 18 *ſt.* the Ell: On Account thereof, endorſed and deliver'd a Bill of 231 *l.* 1 *s.* 5 *d.* Sterling, Exchange at 34 *s.* 7 *d.* payable in Banco, Agio at 3½ *per cent.*; What remains due? *Anſw. Gl.* 1838 : 15 : —

Qu. 31. Sold 20 Tuns of Wine, at 22 *l. Flemiſh per* Tun, and 20 Cask of Brandy, containing 1060 Virtels, at 18½ *l. Flemiſh* for 30 Virtels; abating 1 *per cent.* on both Wine and Brandy. Received, in Part of Payment, a Bill of 439 *l.* 11 *s.* 7 *d.* Sterling at 35 *s. per l.* now, the Agio being at 3⅞ *per cent.* what remains due for the ſaid Wine and Brandy? *Anſw. Gl.* 1701 : 19 : —

Qu. 32. *A* ſold to *B*, 30 Tuns of Wine, at $21\frac{7}{8}$ *l. Flemiſh per* Tun, rebating 1 *per cent.* *B* cauſed write off in the Bank, upon the Account of *A*, 1825 *gl.* if the Agio be reckon'd at the Rate of $4\frac{1}{4}$ *per cent.* what remains due to *A* for the ſaid Wine? *Anſw. Gl.* 1995 : 11 : 8.

Qu. 33. A Merchant at *Paris* ſent a Parcel of Silks to his Correſpondent in *London*, who paid, for Fraight, Cuſtom, and all other Charges, 11 *l.* 6 *s.* $2\frac{1}{4}$ *d.* and ſold the ſame for 76 *l.* 19 *s.* 9 *d.* his Commiſſion for Sales being 2 *per cent.* what is the Neat Proceed? *Anſw.* 64 *l.* 2 *s.* 9 *d.*

The Neat Proceed, is what remains, after all the Charges and Commiſſion or Proviſion, is deducted out of the total Sum the Wares are ſold for.

Qu. 34. A Merchant in *London* got a Parcel of Wares from *France*, coſting there, with all Charges, 793 Livres, 11 Solz, who paid, for

Cuſtom, and all other Charges, in *England*, upon them, 11 *l.* 10 *s.* 7$\frac{1}{4}$ *d.* and ſold them all for a Sum of 88 *l.* 7 *s.* 6 *d.* what does the Neat Gain amount to, Exchange at 56 *d.* per Crown? *Anſwer*, 15 *l.* 2 *s.* 6 *d.*

Qu. 35. A Merchant in *Rotterdam* received 20 Hogſheads of Tobacco, to ſell for his Friend in *London*, he paid, for Fraight, Cuſtom, and all other Charges, *Gl.* 258:17:- and ſold them as follows, *viz.* 9 Hogſheads, for *Gl.* 1037 : 12 : 8, 8 Hogſheads for *Gl.* 945 : 1 : — and 3 Hogſheads for *Gl.* 355 : 9 : 8, being allowed 2 *per cent.* for Sales; what is the Neat Proceed? *Anſw.* *Gl.* 2032 : 10 : —

Qu. 36. A Merchant at *Mallaga*, ſent 1000 Frails of Raiſins, in Commiſſion, to his Friend in *Rotterdam*, who, upon their Arrival, paid, for Freight, Cuſtom, &c. *Gl.* 2178 : 4 : — and ſold them as follows, *viz.* 400 Frails for 3663 *gl.* 200, for 1800 *gl.*; 150 Frails, at 9 *gl.* *per* Piece, rebating 1 *per cent.*

Item, 150 Frails for *Gl.* 1336:10:— and laſtly, 100 Frails for 850 *gl.* his Proviſion being at 2 *per cent.* I demand what the Neat Proceed of theſe Raiſins amounts to? *Anſwer, Gl.* 6628 : 2 : —

Qu. 37. A Merchant at *Jamaica*, Ship'd ſundry Merchandizes for *England* on his own Account and Riſk, and conſign'd them to his Friend in *London*, who diſburſed, for Fraight, Cuſtom, and all other Charges, the Sum of 45 *l.* 10 *s.* 2 *d.* and ſold the ſame, being of Quantity, Quality and Price, as follows, *viz.* 8 Hogſheads of Sugar, poize Neat, 61 C. 3 *qrs.* 15 *lb.* at 29 *s.* 3 *d. per C.* weight; 5 Barrels of Indigo, containing Neat, 11 C. 2 *qrs.* 19 *lb.* at 3 *s.* 10 *d.* the *lb.*; and 3 Hhds. of Pymento, poize Neat, 18 C. 3 *qrs.* 16 *lb.* at 15½ *d. per lb.* Commiſſion at 3½ *per cent.* What comes the Neat Proceed of the ſaid Wares to? *Anſw.* 418 *l.* 1 *s.* 5½ *d.*

Miſcellaneous Queſtions.

Qu. 1. THree Perſons, *A*, *B*, and *C*, diſcourſed together about their Age thus; *B* ſaid to *A*, I am three Years older than you; *C* ſaid, I am tripple the Age of you both; and *A* ſaid, The Sum of all our Years is 76. I demand the Age of each? *Anſwer*, The Age of *A* was 8; of *B*, 11; and of *C*, 57 Years.

This, and ſuch like Queſtions, may eaſily be ſolved thus,

Put u for the Age of *A*; then u + 3 is the Age of *B*, and 6 u + 9 is the Age of *C*.

The Operation.

$$\begin{array}{lll} & A, & u \\ & B, & u+3 \\ & C, & 6u+9 \\ \hline & & 8u+12=76 \\ & & \qquad 12 \text{ ſubtr.} \\ \hline 8 & & 8u=64 \\ \hline & & u=8 \end{array}$$

Qu. 2. *A*, *B*, and *C*, in Company, bought a Parcel of Wares for 152 *l.* whereof *A* paid a certain Sum; *B*, 10 *l.* more than *A*; and *C*, as much as both: What did each Partner diſburſe? *Anſwer*, *A*, 33; *B*, 43; and *C*, 76 *l.*

$$\begin{array}{ll} A, & u \\ B, & u + 10 \\ C, & 2u + 10 \\ \hline & 4u + 20 = 152 \end{array}$$

$$\begin{array}{r} 20 \text{ ſubtr.} \\ \hline 132 \\ 4)\overline{} \\ 33 = u \end{array}$$

Qu. 3. A young Gentleman being ſent abroad, had a certain Number of Guineas given him to defray his Charges: He ſpent $\frac{2}{3}$ and $\frac{1}{5}$ of that Number, and brought home 36: How many had he at firſt ſetting out? *Anſw.* 270.

$$\begin{array}{r|r} & 15 \\ \hline \frac{2}{3} & 10 \\ \frac{1}{5} & 3 \\ \hline & 13 \end{array} \qquad \begin{array}{r} 1 \\ 0\frac{13}{15}\text{ ſubtr.} \\ \hline \frac{2}{15} = 36 \times 15 \\ 180 \\ \hline 540 \\ 2)\overline{} \\ \textit{Facit } 270 \end{array}$$

Qu. 4. A Man, on his Death-bed, leaving his Wife great with Child, made his Will thus; If ſhe bore a Son, then he ſhou'd have $\frac{1}{2}$ and the Mother $\frac{1}{3}$ of his Eſtate; (being worth 3600 *l.* Sterling) but if ſhe brought forth a Daughter, the Mother was to have $\frac{1}{2}$ and her Daughter $\frac{1}{3}$ thereof; now it came to paſs that ſhe was deliver'd of Twins, *viz.* a Son and Daughter. How is the foreſaid 3600 *l.* to be divided, according to the Teſtator's Will? *Anſwer*, To the Son, $1705\frac{5}{19}$ *l.*; to the Mother, $1136\frac{16}{19}$ *l.*; and to the Daughter $757\frac{17}{19}$ *l.*

Find three Numbers, whereof the firſt ſhall be $1\frac{1}{2}$ of the ſecond, and the ſecond $1\frac{1}{2}$ of the third; ſuch are, 9, 6, and 4: found thus,

$$\frac{2}{3} : 1 :: 1 : \frac{3}{2} \qquad \begin{array}{r|r} & 6 \\ \hline \frac{3}{2} & 9 \\ \frac{1}{1} & 6 \\ \frac{2}{3} & 4 \\ \hline & 19 \end{array}$$

The Sum of theſe three Numbers is 19; now ſay,

If 19 give 3600, what will each of theſe apart give? And the Operation will give the Anſw

Qu. 5. Sold 3 Pieces of Silk, containing, $24\frac{1}{2}$, $13\frac{2}{3}$, and 25 Yds. at 9 *s.* 9 *d.* *per* Yard; received in Part of Payment, $34\frac{1}{2}$ Yards of Cloth, at 7 *s.* 8 *d.* the Yard: What remains due? *Anſwer*, 17 *l.* 11 *s.* $4\frac{1}{2}$ *d.*

Qu. 6. Three Merchants, *A*, *B*, and *C*, bought a Ship for a certain Sum, whereof *A* paid $\frac{1}{2}$, *B*, $\frac{1}{3}$, and *C*, the reſt, being 50 *l.* Sterling. I demand the Price of the Ship? *Anſw.* 300 *l.*

1
$0\frac{5}{6}$

$\frac{1}{6} = 50$
6

Fac. 300 *l.*

6
$\frac{1}{2}$ | 3
$\frac{1}{3}$ | 2
5

Qu. 7. Four Men, *A*, *B*, *C*, and *D*, have 8190 *l.* to divide among them, as follows, *viz.* *A* is to have $\frac{1}{3}$ and $\frac{1}{10}$; *B*, $\frac{1}{4}$ and $\frac{1}{10}$; C, $\frac{1}{6}$; and *D*, what remains. I demand the Share of each? *Anſwer*, The Share C, 1365, is 3549 *l.*; of *B*, 2866$\frac{1}{2}$ *l.*; of [illegible] of *D*, 409$\frac{1}{2}$ *l.*

8190
$\frac{1}{3}$ 2730
$\frac{1}{10}$ 819
A, 3549 *l.*

8190
$\frac{1}{4}$ 2047$\frac{1}{2}$
$\frac{1}{10}$ 819
B, 2866$\frac{1}{2}$ *l.*

8190
$\frac{1}{6}$ 1365, *C.*
2866$\frac{1}{2}$
3549
ſubtr. 7780$\frac{1}{2}$
from 8190
D, 409$\frac{1}{2}$

Qu. 8. A younger Son received $66\frac{2}{3}$ *l.* being $\frac{2}{3}$ of $\frac{1}{2}$ his eldeſt Brother's Portion, and $3\frac{1}{2}$ times his eldeſt Brother's Portion was equal to $1\frac{1}{4}$. of their Father's Eſtate. What was the ſaid Portion and Eſtate? *Anſwer*, The eldeſt Brother's Portion was 200 *l.* and the Father's Eſtate 560 *l.*

$\frac{2}{3}$ of $\frac{1}{2}$ is $\frac{1}{3} = 66\frac{2}{3}$

$\overline{}\,3$

$200 \times 3\frac{1}{2}$ is $700 = 1\frac{1}{4}$

$\overline{}\;\overline{}\,4$

$2800 = 5$

$5)\overline{}$

560 *l.*

Qu. 9. Suppoſe the Shadow of a Tower ſtanding upon even Ground to be 120 Feet, and at the ſame time a Two-Foot Ruler gives a Shadow of 16 Inches: I demand the Height of that Tower above Ground? *Anſw.* 180 Feet.

F. *F.* *F.*

$1\frac{1}{3}$ ——— 2 ——— 120

——— 3 ——— 6

4 ——— 6 720

4) ———

Facit 180 *Feet.*

Qu. 10. Suppoſe a Dog in Chaſe of a Fox that is 40 Leaps off, and the Dog gives 6 Leaps for the Fox's 5, both their Leaps being alike: How many Leaps muſt the Dog give, to overtake the Fox? *Anſwer*, 240.

6

$\frac{5}{1}$ ——— 6 ——— 40

——— 6

Facit 240

Qu. 11. A Man left his three Sons 31404*l.* to be divided among them, ſo that the firſt ſhould have $\frac{1}{2}$; the ſecond, $\frac{1}{3}$; and the third, $\frac{1}{4}$ Part. What muſt each have thereof, according to their Father's Will? *Anſwer*, the firſt muſt have $14494\frac{2}{13}$; the ſecond, $9662\frac{10}{13}$; and the third, $7247\frac{1}{13}$ *l.*

$$\begin{array}{r|l} & 12 \\ \hline \frac{1}{2} & 6 \\ \frac{1}{3} & 4 \\ \frac{1}{4} & 3 \\ \hline & 13 \end{array} \quad 13 : 31404 :: \left\{ \begin{array}{l} 6 : 14494\frac{2}{13} \\ 4 : 9662\frac{10}{13} \\ 3 : 7247\frac{1}{13} \end{array} \right.$$

Proof, 31404 *l.*

Qu. 12. A Merchant wou'd beſtow 220 *l.* on Cloves, at 5 *s. per lb.* on Mace, at 11 *s.* the *lb.*; and on Nutmegs, at 6 *s. per lb.*; ſo as to have an equal Quantity of each ſort: How many *lb.* weight of each may he get for the ſaid 220 *l.*? *Anſwer*, 200 *lb.* of each Sort.

$$\begin{array}{rr} 5 & 220 \\ 11 & 20 \\ 6 & \overline{} \\ \overline{} & 4400 \\ 22 & 2)\overline{} \\ & 2200 \\ & 11)\overline{} \end{array}$$

Facit 200 *lb.*

Qu. 13. A Man, on his Death-bed, made his Will thus, *viz.* his Eldeſt Son ſhou'd have $\frac{2}{3}$ of $\frac{1}{4}$ of his Eſtate; his Second Son $\frac{1}{5}$ of $\frac{1}{2}$ of his Eſtate; ſo, when they had received and counted their Portions, they found that the one had 40 *l.* more than the other; the reſt of the Eſtate being for the Mother and younger Children: I demand what his whole Eſtate was, how much the Eldeſt and Second Son had, and what was left for the Widow and younger Children? *Anſwer*, His whole Eſtate amounted to 600 *l.* his Eldeſt Son had for his Portion, 100 *l.* the Second Son had 60 *l.*; and there was 440 *l.* left for the Mother and younger Children, as appears by the following Operation.

$$\begin{array}{l|l}
 & 30 \\ \hline
\frac{2}{3} \text{ of } \frac{1}{4} \text{ is } \frac{1}{6} & 5 \\
\frac{1}{5} \text{ of } \frac{1}{2} \text{ is } \frac{1}{10} & 3 \\ \hline
\end{array}$$

Rem. $\frac{2}{30}$, or $\frac{1}{15}$ = 40 × 15 *l.*

200

His whole Eſtate, 600 *l.*

10)———

The 2d Son's Portion, 60 *l.*

Add, 40

The eldeſt Son's Portion, 100 *l.*

Add, 60

Subſtract, 160

From 600

For the Mother, *&c.* 440 *l.*

FINIS.

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